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UPDATED

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
IN
DIPLOMA
ELECTRICAL ENGINEERING
(FIRST YEAR)
SCHEME OF EXAMINATION & SYLLABUS



FACULTY OF ENGINEERING AND TECHNOLOGY

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

ACADEMIC SESSION 2022-23

(Effective from the academic session 2022-23)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

Faculty of Engineering & Technology

Electrical Engineering

Diploma First Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-I

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	SUBJECT TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEM- C 101	BSC	Mathematics –I	2	1	0	20	10	30	70	3	100
2	DAP- C 101	BSC	Applied Physics-I	2	1	0	20	10	30	70	3	100
3	DAC-C 101	BSC	Applied Chemistry	2	1	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
4	DAP-C 151	BSC	Applied Physics-I Lab	0	0	2	20	10	30	70	1	100
5	DAC-C 151	BSC	Applied Chemistry Lab	0	0	2	20	10	30	70	1	100
6	DSP-S 151	BSP	Physical Training & Yoga	0	0	2	20	10	30	70	1	100
7	DEG- A 151	HSMC	Communication Skills in English Lab	0	0	2	20	10	30	70	2	100
			TOTAL	6	3	8	140	70	210	490	14	700

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SEMESTER-II

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	SUBJECT TOTAL
							SESSIONAL EXAM.			EXAM .ESE		
				L	T	P	CT	TA	TOTAL			
1.	DEM- C 201	BSC	Mathematics-II	3	1	0	20	10	30	70	4	100
2.	DCE- C 201	ESC	Introduction to IT Systems	2	1	0	20	10	30	70	3	100
3.	DEE- C 201	ESC	Fundamental of Electrical Engineering & Electronics Engineering	3	1	0	20	10	30	70	4	100
4.	DEN- A 201	HSMC	Environment Science	2	0	0	20	10	30	70	1	100
PRACTICAL / TRAINING / PROJECT												
5.	DCE- C 251	ESC	Introduction to IT Systems Lab	0	0	2	20	10	30	70	2	100
6.	DEE- C 251	ESC	Fundamental of Electrical Engineering & Electronics Engineering Lab	0	0	2	20	10	30	70	2	100
7.	DME- C 251	ESC	Workshop Practices	0	0	2	20	10	30	70	1	100
8.	DME- C 252	ESC	Engineering Graphics Lab	0	0	2	20	10	30	70	2	100
9	DEE-C 260	ESC	Seminar	0	0	2	20	10	30	70	1	100
10.	Industrial Exposure (Saraswati Yatra) DEE-C261			0	0	0	0	0	0	50	0	50
TOTAL				10	3	10	180	90	270	680	20	950
*Industrial visit compulsory at minimum ONE Industries or Department.												

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
IN
DIPLOMA
ELECTRICAL ENGINEERING
(SECOND YEAR)
SCHEME OF EXAMINATION & SYLLABUS



FACULTY OF ENGINEERING AND TECHNOLOGY

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

ACADEMIC SESSION 2022-23

(Effective from the academic session 2022-23)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

Faculty of Engineering & Technology

Electrical Engineering

Diploma Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-III

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	Subject TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 301	ESC	Electrical Circuits	3	0	0	20	10	30	70	3	100
2	DEE- C 302	ESC	Electrical and Electronic Measurements	3	0	0	20	10	30	70	3	100
3	DEE- C 303	ESC	Electrical and Electronics Engineering Materials	3	0	0	20	10	30	70	3	100
4	DEE- C 304	ESC	Electric Motors and Transformers	3	0	0	20	10	30	70	3	100
5	DEE- C 305	ESC	Principles of Electrical Wiring, Design and Drawing	3	0	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
6	DEE C -351	ESC	Electrical Circuits Laboratory	0	0	2	20	10	30	70	1	100
7	DEE- C 352	ESC	Electrical and Electronic Measurements Laboratory	0	0	2	20	10	30	70	1	100
8	DEE- C 353	ESC	Electric Motors and Transformers Laboratory	0	0	2	20	10	30	70	1	100
9	DEE- C 354	ESC	Electrical Workshop	0	0	2	20	10	30	70	1	100
10	DEE-C 360	ESC	Seminar	0	0	0	20	10	30	70	1	100
			TOTAL	15	0	10	200	100	300	700	20	1000

(Effective from the academic session 2022-23)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

Faculty of Engineering & Technology

Electrical Engineering

Diploma Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-IV

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	SUBJECT TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 401	ESC	Electric Power Transmission and Distribution	2	1	0	20	10	30	70	3	100
2	DEE- C 402 /DET- C 402	ESC	Electronics Devices and Circuits	2	1	0	20	10	30	70	3	100
3	DEE- C 403	ESC	Estimating and Costing in Electrical Engineering	2	1	0	20	10	30	70	3	100
4	DEE- P 4XX	ESC	PEC-I	3	0	0	20	10	30	70	3	100
5	DEE- P 4XX	ESC	PEC-II	3	0	0	20	10	30	70	3	100
6	~~DHU- A 401~~	HSMC	Indian Knowledge Tradition	2	0	0	20	10	30	70	0	100
PRACTICAL / TRAINING / PROJECT												
7	DEE- C 451	ESC	Electric Power Transmission and Distribution Laboratory	0	0	3	20	10	30	70	1	100
8	DEE- C 452 /DET- C 452	ESC	Electronics Devices and Circuits Laboratory	0	0	2	20	10	30	70	1	100
9	DEE- C 453	ESC	AC Machines Laboratory	0	0	3	20	10	30	70	1	100
			TOTAL	14	3	8	180	90	270	630	18	900

Program Elective-I

1. DEE- P 404 Advanced Course in Machines
2. DEE- P 406 Neural Fuzzy and Control

Program Elective-II

1. DEE- P 405 Power Plant Engineering
2. DEE- P 407 Installation and Maintenance of Electrical Equipment

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
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COURSE OF STUDY
IN
DIPLOMA
ELECTRICAL ENGINEERING
(THIRD YEAR)
SCHEME OF EXAMINATION & SYLLABUS



FACULTY OF ENGINEERING AND TECHNOLOGY

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

ACADEMIC SESSION 2022-23

(Effective from the academic session 2022-23)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

Faculty of Engineering & Technology

Electrical Engineering

Diploma Third Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-V

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	SUBJECT TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 501	ESC	Control Systems	3	0	0	20	10	30	70	3	100
2	DEE- C 502	ESC	~~Industrial Electronics and Control of Drives~~ Industrial Power Electronics	3	0	0	20	10	30	70	3	100
3	DEE- C 503 / DET- C 503	ESC	Digital Electronics and Microprocessor	3	0	0	20	10	30	70	3	100
4	DEE- P 504	ESC	PEC-III	3	0	0	20	10	30	70	3	100
5	DEE- O 505	ESC	OEC-I	3	0	0	20	10	30	70	3	100
			PRACTICAL / TRAINING / PROJECT									
6	DEE- C 551	ESC	Control Systems Laboratory	0	0	2	20	10	30	70	1	100
7	DEE-C 552	ESC	Industrial Power Electronics ~~and Control of Drives~~ Laboratory	0	0	2	20	10	30	70	1	100
8	DEE- C 553 / DET- C 553	ESC	Digital Electronics and Microprocessor Laboratory	0	0	2	20	10	30	70	1	100
9	DEE-C 554	ESC	Minor Project	0	0	4	20	10	30	70	2	100
10	DEE-C 555	ESC	Summer Internship (4 Weeks)	To be pursued during summer vacation, submit a certificate of completion in the department (in summer break after IV semester exam and will be assessed during V semester)							1	100
			TOTAL	15 ~~17~~	0	10	180	90	300	630	21	1000

Program Elective-III

1. DEE- P 504 Substation Switchgear and Protection
2. DEE- P 505 Illumination Practices

Open Elective-I

1. DEE- O 505 Renewable Energy
2. DEE- O 506 Project Management

(Effective from the academic session 2022-23)

GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR

Faculty of Engineering & Technology

Electrical Engineering

Diploma Third Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VI

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	Subject TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 601	ESC	Industrial Automation and Control	2	1	0	20	10	30	70	3	100
2	DEE- C 602	ESC	Energy Conservation and Auditing	2	1	0	20	10	30	70	3	100
3	DEE- C 603	ESC	Utilization of Electrical Energy	2	1	0	20	10	30	70	3	100
4	DEE- P 604	ESC	PEC-IV	3	0	0	20	10	30	70	3	100
5	DEE- O 605	ESC	OEC-II	3	0	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
7.	DEE- C 661	ESC	Major Project	0	0	16	0	100	100	300	8	400
			TOTAL	12	3	16	120	60	180	420	19	900

Program Elective-IV

1. DEE- P 604 Energy Management
2. DEE-P 605 Electric Vehicles

Open Elective-II

1. DEE- O 605 Entrepreneurship Development and Management
2. DCE- O 606 Artificial Intelligence and Machine Learning

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

MATHEMATICS- I
DEM-C 101

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of algebra.

UNIT I

Basic Concepts: Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios ofmultiple angles, sub-multiple angles (2A, 3A, A/2), Graphs of sin x, cos x, tan x and e^x.

UNIT II

Differential Calculus: Definition of function, Concept of limits, Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x - a}$, $\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to a} \frac{a^x - 1}{x}$, $\lim_{x \to a} (1 + x)^{\frac{1}{x}}$, Differentiation by definition of x^n, **sinx , cosx , tanx** , e^x, $\log_a x$. Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

UNIT III

Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a com- plex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number. De-movier's theorem, its application.

UNIT IV

Partial fractions: Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

UNIT V

Permutations and Combinations: Value of ${}^{n}P_{r}$ and ${}^{n}C_{r}$.

Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomialapproximation with applications to engineering problems

Course Outcomes: After completing this course the students shall understand the following points:

- To acquire necessary background in Determinants and Matrices so as to appreciate the importance of the determinants.
- To understand the cumulative effect of the original quantity or equation i.e., the Integration.
- To interpret the coordinate geometry that provides a connection between algebra and geometry through graphs of lines and curves.
- To explain the factors that scale different parameterizations so that they all produce same overall integrals, i.e. they are capable of encoding the inherent geometry of the original shape.
- To explain the difference between a resultant and a concurrent force to model simple physical problems in the form of a differential equation, analyze and interpret the solutions.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)

Reference Books:

1. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e, vikas Publishing House.
2. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

APPLIED PHYSICS-I
DAP-C 101

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- aims to give an understanding of this world both by observation and by prediction of the way in which objects behave.
- apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

UNIT I

Optics: Basic optical laws, reflection and refraction, refractive index, images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects, total internal reflection, critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.

UNIT II

Electrostatics: Coulomb's law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and Potential difference, Gauss law: Application of Gauss's law to find electric field strength of straight charged conductor, Plane charged sheet and charged sphere.

Capacitor and its working: Types of capacitors, Capacitance and its units, Capacitance of parallel plate capacitor, Series and Parallel combination of capacitors (related numerical problems), Dielectric and its effect on capacitance, Dielectric break down.

UNIT III

Current Electricity: Electric currents and its units, Direct and Alternating currents, Resistance and its units, Specific resistance, Conductance, Specific Conductance, Series and Parallel Combination of resistances, Factors affecting resistance of a wire, Carbon resistances and colour coding.

Ohm's law and its verification, Kirchhoff's laws, Wheatstone Bridge and its applications (Slide wire bridge only), Concept of terminal potential difference and electromotive force (EMF).

Heating effect of current, Electric power, Electric energy and its units (related numerical Problem), Advantages of Electric energy over other forms of energy.

UNIT IV

Electromagnetism: Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and its units, magnetization.

Concept of electromagnetic induction: Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

UNIT V

Semiconductor Physics: Energy bands in solids, Types of materials (Insulator, semiconductor, conductor), Intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes, Diode as rectifier- half wave and full wave rectifier (centre taped).

Transistor: Description and three terminals, Types- pnp and npn, some electronic applications (list only). Photo cells, Solar cells; working principle and Engineering applications.

Course Outcomes: After completing this course the students shall understand the following points:

- State basic optical laws, establish the location of the images formed by mirrors and thin converging lens, Design and assemble of microscope using lenses combination.
- Describe refractive index of a liquid or a solid and will be able to explain conditions for total internal reflection.
- Define capacitance and its unit, explain the function of capacitors in simple circuits and solve simple problems.
- Differentiate among insulators, conductors and semiconductors and define the terms: potential, potential difference, electromotive force.
- Express electric current as flow of charge, concept of resistance, measurement of the parameters: electric current, potential difference, resistance.

Text Books:

1. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
2. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
3. A Textbook of Optics, N Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.
4. Introduction to Fiber Optics, Ajoy Ghatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.

Reference Books:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

APPLIED CHEMISTRY
DAC-C 101

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Solve various engineering problems applying the basic knowledge of atomic structure andchemical bonding.
- Use relevant water treatment method to solve domestic and industrial problems.
- Solve the engineering problems using knowledge of engineering materials and properties.
- Use relevant fuel and lubricants for domestic and industrial applications

UNIT I

Atomic Structure, Chemical Bonding and Solutions: Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principle, Quantum numbers – orbital concept. Shapes of s,p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

UNIT II

Water: Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.

Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measure- ment of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.

UNIT III

Engineering Materials: Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, metallurgy – brief account of general principles of metallurgy. Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.

UNIT IV

Chemistry of Fuels and Lubricants: Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula.

Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical properties and chemical properties.

UNIT V

Electro-Chemistry: Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems. Industrial Application of Electrolysis.

Course Outcomes: After completing this course the students shall understand the following points:

- Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.
- Qualitatively analyze the engineering materials and understand their properties and applications.
- Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products.

Text Books:

1. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
2. Dara, S. S. & Dr.S.S.Umare, Engineering Chemistry, S.Chand. Publication, New Delhi, New Del- hi, 2015.
3. Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015.
4. Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.

Reference Books:

1. Dr. G. H. Hugar & Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II,NITTTR, Chandigarh, Publications, 2013-14.
2. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Applied Physics-I Laboratory

DAP-C151

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

LIST OF EXPERIMENTS

1. To determine velocity of ultrasonic in different liquids using ultrasonic interferometer.
2. To verify laws of reflection from a plane mirror/ interface.
3. To verify laws of refraction (Snell's law) using a glass slab.
4. To determine focal length and magnifying power of a convex lens.
5. To verify Ohm's law by plotting graph between current and potential difference.
6. To verify laws of resistances in series and parallel combination.
7. To find the frequency of AC main using electrical vibrator.
8. To verify Kirchhoff's law using electric circuits.
9. To study the dependence of capacitance of a parallel plate capacitor on various factors and determines permittivity of air at a place.
10. To find resistance of a galvanometer by half deflection method.
11. To convert a galvanometer into an ammeter.
12. To convert a galvanometer into a voltmeter.
13. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee volt- age.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Applied Chemistry Laboratory
DAC- C 151

MM: 100
TIME: 2 Hrs.
L T P
0 0 2

SESSIONAL: 30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. Preparation of standard solution of oxalic acid or potassium permanganate.
2. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
3. Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by $KMnO_4$ solution.
4. Iodometric estimation of copper in the copper pyrite ore.
5. Volumetric estimation of total acid number (TAN) of given oil.
6. Volumetric estimation of
   - Total hardness of given water sample using standard EDTA solution.
   - Alkalinity of given water sample using 0.01M sulphuric acid
7. Determine the conductivity of given water sample.
8. Determination of the Iron content in given cement sample using colorimeter.
9. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
10. Determination of viscosity of lubricating oil using Redwood viscometer.
11. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
12. To verify the first law of electrolysis of copper sulfate using copper electrode.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Physical Training & Yoga
DSP- S 151

MM:100
TIME: 3 Hrs
L T P
0 0 2

SESSIONAL:30
ESE: 70
CREDITS: 1

1. Introduction to Physical Education

- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education
- Changing trends in Physical Education

2. Olympic Movement

- Ancient & Modern Olympics (Summer & Winter)
- Olympic Symbols, Ideals, Objectives & Values
- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

3. Physical Fitness, Wellness & Lifestyle

- Meaning & Importance of Physical Fitness & Wellness
- Components of Physical fitness
- Components of Health related fitness
- Components of wellness
- Preventing Health Threats through Lifestyle Change
- Concept of Positive Lifestyle

4. Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga

- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respi- ratory System, Neuro-Muscular System etc.)

5. Kinesiology, Biomechanics & Sports

- Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
- Newton's Law of Motion & its application in sports.
- Friction and its effects in Sports.

6. Postures

- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.
- Concept & advantages of Correct Posture.
- Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders;

- Lordosis, Ky- phosis, Bow Legs and Scoliosis.
- Corrective Measures for Postural Deformities

7. Yoga

- Meaning & Importance of Yoga
- Elements of Yoga
- Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas
- Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Sha- shankasana)
- Relaxation Techniques for improving concentration - Yog-nidra

8. Yoga & Lifestyle

- Asanas as preventive measures.
- Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana.
- Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.
- Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.
- Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana,
- Pavan Muktasana, Ardh Matsyendrasana.
- Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana,
- Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

9. Training and Planning in Sports

- Meaning of Training
- Warming up and limbering down
- Skill, Technique & Style
- Meaning and Objectives of Planning.
- Tournament – Knock-Out, League/Round Robin & Combination.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Communication Skills in English Laboratory
DEG-A 151

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

LIST OF EXPERIMENTS

1. **Listening Skills:**
   Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

2. **Introduction to Phonetics:**
   Sounds: consonant, vowel.

3. **Speaking Skills:**
   Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

MATHEMATICS- II
DEM-C 201

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To give a comprehensive coverage at an introductory level to the subject of matrices, Integral Calculus coordinate geometry, Basic elements of vector algebra and First Order Differential Equations.

UNIT I

Determinants and Matrices: Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT II

Integral Calculus: Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formula $\int_0^{\frac{\pi}{2}} sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} cos^n x\, dx$, and $\int_0^{\frac{\pi}{2}} sin^m x\, cos^n x\, dx$ for solving problems Where m and n are positive integers. Applications of integration for (i) Simple problem on evaluation of area bounded by a curve and axes, (ii)Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT III

Co-Ordinate Geometry: Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.General equation of a circle and its characteristics. To find the equation of a circle, given: (i) Centre and radius (ii)Three points lying on it and (iii)Coordinates of end points of a diameter. Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

UNIT IV

Vector Algebra: Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT V

Differential Equations: Solution of first order and first-degree differential equation by variable separation method (simple problems). MATLAB – Simple Introduction.

Course Outcomes: After completing this course the students shall understand the following points:

- To acquire necessary background in Determinants and Matrices so as to appreciate the importance of the determinants.
- To understand the cumulative effect of the original quantity or equation i.e., the Integration.
- To interpret the coordinate geometry that provides a connection between algebra and geometry through graphs of lines and curves.
- To explain the factors that scale different parameterizations so that they all produce same overall integrals, i.e. they are capable of encoding the inherent geometry of the original shape.
- To explain the difference between a resultant and a concurrent force to model simple physical problems in the form of a differential equation, analyze and interpret the solutions.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)

Reference Books:

1. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e, vikas Publishing House.
2. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

INTRODUCTION TO IT SYSTEMS
DCE-C 201

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To make new students comfortable with computing environment
- Learning basic computer skills, Learning basic application software tools, Understanding Computer Hard- ware, Cyber security awareness

UNIT I

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals.
General understanding of various computer hardware components – CPU, Memory, Display, Key- board, Mouse, HDD and other Peripheral Devices.

UNIT II

Linux: OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.

UNIT III

HTML: HTML4, CSS, making basic personal webpage

UNIT IV

Office Tools: Open Office Writer, Open Office Spreadsheet (Calc), Open Office Impress.

UNIT V

Information security best practices

Course Outcomes: After completing this course the students shall understand the following points:

- Able to comfortably work on computer, install and configure OS, assemble a PC.
- Able to connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/ attacks.

Text Books:

1. R.S. Salaria, Computer Fundamentals, Khanna Publishing House
2. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House

Reference Books:

1. Online Resources, Linux man pages, Wikipedia
2. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Fundamentals of Electrical and Electronics Engineering
DEE-C 201

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To provide basic knowledge of the different elements and concepts of electrical engineering field.
- To learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications.
- To understand digital electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

UNIT I

Overview of Electrical & Electronic Components: Passive-Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, aver- age, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources.

UNIT II

Overview of Digital Electronics & Analog Circuits: Introduction to Boolean Algebra, Gates-Functional Block Approach, Storage elements-Flip Flops, Counters: Ripple, Up/down and decade, Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Applications of Op-Amp.

UNIT III

Electric and Magnetic Circuits: EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hyster- esis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits

UNIT IV

AC Circuits: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits; Power in A. C. Circuits, power triangle.

UNIT V

Transformer and Machines: General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

Course Outcomes: After completing this course the students shall understand the following points:

- To analysis of Single-Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits.
- To acquire knowledge about the interconnection of elements in a system, classification of signals and basic operations on signals.
- To analysis of resistive circuits and two terminal element relationships for inductors and capacitors in electric and magnetic circuits.
- To apply the knowledge of mathematics, science and engineering principles for modeling, analyzing and solving electrical and electronics engineering problems.
- To understand and demonstrate the practical use of transformer and electrical machines.

Text Books:

1. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5.
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353.
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405.
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375.

Reference Books:

1. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239.
2. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
3. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833.
4. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13: 0070634244-978.
5. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Environmental Science.

ENVIRONMENT SCIENCE

DEN-A 201

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Solve various engineering problems applying ecosystem to produce eco – friendly products.
- Use relevant air and noise control method to solve domestic and industrial problems.
- Use relevant water and soil control method to solve domestic and industrial problems.
- To recognize relevant energy sources required for domestic and industrial applications.
- Solve local solid and e-waste problems.

UNIT I

Ecosystem: Structure of ecosystem, Biotic & Abiotic components, , Food chain and food web, Aquatic (Lentic and Lotic) and terrestrial ecosystem Carbon, Nitrogen, Sulphur, Phosphorus cycle.

Global warming: Causes, effects, process, Green House Effect, Ozone depletion

UNIT II

Air and, Noise Pollution: Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refriger- ants, I.C., Boiler).

Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator)., Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrig- erants, I.C., Boiler. Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollu- tion, Noise pollution (Regulation and Control) Rules, 2000

UNIT III

Water and Soil Pollution: Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation, Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis). Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

UNIT IV

Renewable sources of Energy: Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate col- lector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills.
Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas.
Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.
New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy

UNIT V

Solid Waste Management & Environmental Management: Solid waste generation-Sources and characteristics of : Municipal solid waste, E- waste, bio- medical waste, Metallic wastes and Non-Metallic wastes.(lubricants, plastics, rubber) from industries, Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste, Air quality act 2004, air pollution control act 1981 and water pollution and control act1996. Structure and role of Central and state pollution control board, Concept of Carbon Credit, Carbon Footprint. Environmental management in fabrication industry.

Course Outcomes: After completing this course the students shall understand the following points:

- Understand the ecosystem and terminology and solve various engineering problems ap- plying ecosystem knowledge to produce eco – friendly products.
- Understand the suitable air, extent of noise pollution, and control measures and acts.
- Understand the water and soil pollution, and control measures and acts.
- Understand different renewable energy resources and efficient process of harvesting.
- Understand solid Waste Management, ISO 14000 & Environmental Management.

Text Books:

1. Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099-
2. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.
3. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi
4. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.
5. Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07- 451871-8.

Reference Books:

1. Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978,ISBN: 9780070354760.
2. Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Introduction to IT Systems Laboratory
DCE-C 251

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

LIST OF EXPERIMENTS

1. Browser features, browsing, using various search engines, writing search queries
2. Visit various e-governance/Digital India portals, understand their features, services of- fered
3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognise various ports/interfaces and related cables, etc.
4. Install Linux and Windows operating system on identified lab machines, explore various
5. options, do it multiple times
6. Connect various peripherals (printer, scanner, etc.) to computer, explore various features
7. of peripheral and their device driver software.
8. Practice HTML commands, try them with various values, make your own Webpage
9. Explore features of Open Office tools, create documents using these features, do it multi- ple times
10. Explore security features of Operating Systems and Tools, try using them and see what happens.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Fundamental of Electrical & Electronics Engineering Laboratory

DEE- C 251

MM: 100
TIME: 2 Hrs.
L T P
0 0 2

SESSIONAL: 30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. To measure voltage, current and power in 1-phase circuit with resistive load.
2. Verification of Kirchhoff's laws.
3. Calibration of voltmeter and ammeter.
4. To connect single phase transformer and measure input and output quantities.
5. To connect resistors in series and parallel combination on bread board.
6. Test the performance of Zener diode.
7. Test the performance of LED.
8. Use multimeter to measure the value of given resistor.
9. Determine the value of given resistor using digital multimeter to confirm with colour code.
10. Test the performance of PN-junction diode.
11. To determine the permeability of magnetic material by plotting its B-H curve.
12. Use LCR-Q tester to measure the value of given capacitor and inductor.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Workshop Practices
DME-C 251

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

LIST OF EXPERIMENTS

1. Carpentry:

- Demonstration of different wood working tools / machines.
- Demonstration of different wood working processes like plaining, marking, chiseling, grooving ,turning of wood etc.
- One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

2. Fitting:

- Demonstration of different fitting tools and drilling machines and power tools
- ii) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc.
- One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc

3. Welding:

- Demonstration of different welding tools / machines.
- Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding.
- One simple job involving butt and lap joint

4. Sheet Metal Working:

- Demonstration of different sheet metal tools / machines.
- Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting.
- One simple job involving sheet metal operations and soldering and riveting.

5. Electrical House Wiring: Practice on simple lamp circuits

- one lamp controlled by one switch by surface conduit wiring,
- Lamp circuits- connection of lamp and socket by separate, switches.
- Connection of Fluorescent lamp/tube light,
- Simple lamp circuits-install bedroom lighting.
- Simple lamp circuits- install stair case wiring.

6. Demonstration:

- Demonstration of measurement of Current, Voltage, Power and Energy.
- ii) Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories.
- iii) Tools for Cutting and drilling

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Engineering Graphics Laboratory
DME-C 252

MM:50
TIME: 2 Hrs
L T P
1 0 2

SESSIONAL:15
ESE: 35
CREDITS: 2

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.
- To develop drafting and sketching skills, to know the applications of drawing equipments, and get familiarize with Indian Standards related to engineering drawings.
- To develop skills to visualize actual object or a part of it, on the basis of drawings.
- To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.
- To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD.

UNIT I

Basic elements of Drawing: Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications. Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale. Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning. Geometrical and Tangency constructions. (Redraw the figure)

UNIT II

Orthographic projections: Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination). Introduction to orthographic projection, First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only).

UNIT III

Isometric Projections: Introduction to isometric projections. Isometric scale and Natural scale. Isometric view and isometric projection. Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.

UNIT IV

Free Hand Sketches of engineering elements: Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, Locking arrangements. (For branches other than

mechanical Engineering, the teacher should select branch specific elements for free hand sketching), Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)

UNIT V

Computer aided drafting interface: Computer Aided Drafting: concept, Hardware and various CAD software available. System requirements and Understanding the interface.

Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.

File features: New file, saving the file, Opening an existing drawing file, Creating templates, Quit, Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.

Computer aided drafting: Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Polyline.

Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.

Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers.

Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions. Dim scale variable. Editing dimensions. Text: Single line Text, Multiline text. Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

Course Outcomes: After completing this course the students shall understand the following points:

- Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing
- Draw views of given object and components.
- Sketch orthographic projections into isometric projections and vice versa.
- Apply computer aided drafting tools to create 2D engineering drawings.

Text Books:

1. Bureau of Indian Standards. Engineering Drawing Practice for Schools and Colleges IS: Sp-46. BIS. Government of India, Third Reprint.
2. Bhatt, N. D. Engineering Drawing. Charotar Publishing House, Anand, Gujrat.
3. Dhawan, R. K. Engineering Drawing. S. Chand and Company, New Delhi.

Reference Books:

1. Shah, P. J. Engineering Drawing. S. Chand and Company, New Delhi.
2. Autodesk. AutoCAD User Guide. Autodesk Press, USA

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ELECTRICAL CIRCUITS
DEE-C 301

SESSIONAL:30
ESE: 70
CREDITS: 3

MM:100
TIME: 3 Hrs
L T P
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To maintain electrical systems applying AC and DC circuit fundamentals.
- To understand the concept of graphical solution to electrical network.
- To understand frequency response in electrical circuits.
- To learn a number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis, theorems, source transformation and several methods of simplifying networks.

UNIT I

Single Phase A.C Series Circuits: Generation of alternating voltage, Phasor representation of sinusoidal quantities R, L, C circuit elements its voltage and current response, R-L, R-C, R-L-C combination of A.C series circuit, impedance, reactance, impedance triangle, Power factor, active power, reactive power, apparent power, power triangle and vector diagram.

UNIT II

Single Phase A.C Parallel Circuits: R-L, R-C and R-L-C parallel combination of A.C. circuits. Impedance, reactance, phasor diagram, impedance triangle, R-L, R-C, R-L-C parallel A.C. circuits power factor, active power, apparent power, reactive power, power triangle.

UNIT III

Three phase Circuits: Phasor and complex representation of three phase supply, Phase sequence and polarity, Types of three-phase connections, Phase and line quantities in three phase star and delta system, Balanced and unbalanced load, three phase power, active, reactive and apparent power in star and delta system.

UNIT IV

Network Reduction and Principles of Circuit Analysis: Source transformation, Star/delta and delta/star transformation, Mesh Analysis, Node Analysis.

UNIT V

Network Theorems: Superposition theorem. Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Duality in electric circuits.

Course Outcomes: After completing this course the students shall understand the following points:

- Troubleshoot problems related to single phase A.C series circuits.
- Troubleshoot problems related to single phase A.C parallel circuits.
- Troubleshoot problems related to three phase circuits.
- Use principles of circuit analysis to troubleshoot electric circuits.
- Apply network theorems to troubleshoot electric circuits.

Text Books:

1. Ashfaq Husain, Networks & Systems, Khanna Book Publishing, New Delhi.
2. Gupta, B.R; Singhal, Vandana;, Fundamentals of Electrical Network, S.Chand and Co., New Delhi, ISBN : 978-81-219-2318-7
3. Saxena, S.B Lal; Dasgupta, K; Fundamentals of Electrical Engineering, Cambridge University
4. Press Pvt. Ltd., New Delhi, ISBN : 978-11-0746-435-3
5. Theraja, B. L. : Theraja, A. K;, A Text Book of Electrical Technology Vol-I, S. Chand & Co. Ram- nagar, New Delhi, ISBN : 9788121924405.

Reference Books:

1. Sudhakar, A. ; Shyammohan, S. Palli; Circuit and network, McGraw Hill Education, New Delhi, ISBN : 978-93-3921-960-4.
2. Bell, David A., Electric Circuits, Oxford University Press New Delhi, ISBN : 978-01-954-2524-6
3. Boylested, R.L., Introductory circuit Analysis, Wheeler, New Delhi,ISBN: 978-00-231-3161-5
4. Mittle, V.N. ;Mittle, Arvind; Basic Electrical Engineering, McGraw Hill Education, Noida, ISBN: 978-00-705-9357-2
5. Sivanandam, S.N, Electric Circuit Analysis, Vikas Publishing House Pvt. Ltd, Noida, ISBN:978-81259-1364-1
6. Salivahanan, S.; Pravinkumar, S; Circuit theory, Vikas Publishing House Pvt. Ltd, Noida; ISBN:978-93259-7418-0

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical and Electronics Measurement

DEE- C 302

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To provide basic knowledge of the different elements and concepts of electrical and electronics measurement.
- To address the underlying concepts and methods behind Electronics measurements.
- Identify various types of electronic instrument suitable for specific measurement.

UNIT I

Fundamentals of Measurements: Significance, units, fundamental quantities and standards, Classification of measuring instruments: indicating, recording and integrating instruments.

UNIT II

Measurement of voltage and current: DC Ammeter: Basic, Multi range, Universal shunt, DC Voltmeter: Basic, Multi-range, concept of loading effect and sensitivity, AC voltmeter: Rectifier type (half wave and full wave), CT and PT.

UNIT III

Measurement of Electric Power: Analog meters: Permanent magnet moving coil (PMMC) and Permanent magnet moving iron (PMMI) meter, their construction, working, salient features, merits and demerits, Dynamometer type wattmeter: Construction and working, One, two and three wattmetermethod.

UNIT IV

Measurement of Electric Energy: Single and three phase electronic energy meter: Constructional features andworking principle, Errors and their compensations.

UNIT V

Circuit Parameter Measurement, CRO and Other Meters: Measurement of resistance: Low resistance: Kelvin's double bridge, Medium Resistance: Voltmeter and ammeter method Single beam/single trace CRO, Digital storage Oscilloscope: Basic block diagram, working, Cathode ray tube

Course Outcomes: After completing this course the students shall understand the following points:

- Check the working of the electrical measuring instrument.
- Use different types of measuring instruments for measuring voltage and current.

- Use different types of measuring instruments for measuring electric power
- Use different types of measuring instruments for measuring electric energy.
- Use different types of electrical instruments for measuring various ranges of electrical parameters.

Text Books:

1. Mittle V. N., Basic Electrical Engineering, McGraw-Hill New Delhi, ISBN : 97800700885725.
2. Edward Hughes, Electrical Technology, Pearson Education, New Delhi, ISBN-13: 978-0582405196

Reference Books:

1. Rajput R.K., Electrical and Electronic Measurement and Instrumentation, S.Chand and Co. New Delhi, ISBN : 9789385676017
2. Sawhney A.K., Electrical and Electronics Measurements and Instrumentation., Dhanpai Rai and Sons.New Delhi, ISBN : 9780000279744
3. Suryanarayna N.V., Electrical Measurements and Measuring Instruments, S.Chand and Co. New Delhi , ISBN :8121920116

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS
DEE-C 303

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To impart the knowledge of conducting, dielectric, insulating and magnetic materials and their applications.
- To impart the knowledge of superconducting materials and their applications.
- To impart the knowledge of plastics and materials for Opto - Electronic devices.

UNIT I

Introduction to Electrical and Electronic Materials: Importance of materials, Classification of electrical and electronic materials, Requirement of Engineering materials, Classification of solids on the basis of energy gap, Products – working principle and materials.

UNIT II

Conductive Materials and Applications: Introduction, Semiconductor materials, Types of conducting materials, Low resistivity materials, High resistivity materials.

Dielectrics: Introduction to dielectric materials, classification of dielectric materials, Dielectric constant, Dielectric strength and Dielectric loss.

UNIT III

Magnetic Materials: Origin of permanent magnetic dipole, Magnetic terminology, Relation between relative permeability and magnetic susceptibility. Classification of magnetic materials, Diamagnetic, Paramagnetism, Ferromagnetism, Anti- ferromagnetism and the corresponding materials, Ferrimagnetism and ferrites, Soft and hard magnetic materials, High energy magnetic materials, magnetostriction.

UNIT IV

Superconductive Materials: Concept of superconductor, Meaning of phenomenon of super--conductivity, Properties of superconductors, Types of superconductors, Critical magnetic field and critical temperature, Ideal and Hard superconductors, Mechanism of superconduction.

UNIT V

Plastics: Introduction, Thermoplastics, Rubbers, Thermosets, DC and AC properties, Mechanical properties and processing of plastic, Photoconductivity, Photoconductive cell.

Course Outcomes: After completing this course the students shall understand the following points:

- To identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- To understand the relationship between structure-processing-properties for selection of existing materials and development of new materials in the design of parts, structures, and devices.
- To understand the microstructure characteristics, electronic properties, materials formation, and manipulation of microstructure for application in engineering design and materials processing.

Text Books:

1. Advanced Electrical and Electronics Materials; Processes and Applications K.M. Gupta Nishu Gupta Wiley First Edition, 2015.
2. V.Raghavan – Materials Science & Engineering. – Prentice Hall of India Pvt. Ltd., New Delhi.
3. Murthy & Jena: Structure and properties of Engineering Materials ,TMH New Delhi

Reference Books:

1. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, Electronic Engineering Materials R.K. Shukla Archana Singh McGraw Hill 2012
2. Electrical Properties of Materials L Solymar et al Oxford 9th Edition, 2014
3. Electrical Engineering Materials A.J. Dekker Pearson 2016
4. Principle of Electronic Materials and Devices S.O. Kasap McGraw Hill 3rd Edition 2010.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electric Motors and Transformers

DEE-C 304

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
- Maintain electric motors and transformers.

UNIT I

DC generator: construction, parts, materials and their functions. Principle of operation of DC generator: Fleming's right hand rule, schematic diagrams, e.m.f. equation of generator, armature reaction, commutation and, Applications of DC generators.

UNIT II

DC motor: Types of DC motors. Fleming's left hand rule. Principle of operation of, Back e.m.f. and its significance, Voltage equation of DC motor, Torque and Speed; Armature torque, Shaft torque, losses, efficiency. DC motor starters: Necessity, two point and three point starters. Speed control of DC shunt and series motor: Flux and Armature control. Brushless DC Motor: Construction and working.

UNIT III

Single Phase Transformers: Types of transformers: Shell type and core type; Construction: Parts and functions, Transformer: Principle of operation, EMF equation of transformer: Derivation, Voltage trans- formation ratio, Transformer No-load and on-load phasor diagram, Leakage reactance, Equivalent circuit of transformer, Voltage regulation and Efficiency: Direct loading, OC/SC method, All day efficiency.

UNIT IV

Three Phase Transformers: Bank of three single phase transformers, Single unit of three phase transformer, Distribution and Power transformers. Construction, cooling, Three phase transformers connections as per IS:2026 (part IV)-1977, Three phase to two phase conversion (Scott Connection).

UNIT V

Special Purpose Transformers: Single phase and three phase auto transformers: Construction, working and applications. Instrument Transformers: Construction, working and applications of Current transformer and Potential transformer.

Course Outcomes: After completing this course the students shall understand the following points:

- Maintain different types of DC generators.
- Maintain different types of DC motors.
- Maintain single phase transformer.
- Maintain three phase transformers.
- Maintain different types of special purpose transformers used in different applications.

Text Books:

1. G.C. Garg & P.S. Bimbhra, Electrical Machines, Vol-I, II, Khanna Book Publishing House (ISBN: 978-9386173-447, 978-93-86173-607), New Delhi
2. Mittle, V.N. and Mittle, Arvind., Basic Electrical Engineering, McGraw Hill Education, New Delhi, ISBN:9780070593572
3. Kothari, D. P.and Nagrath, I. J., Electrical Machines, McGraw Hill Education. New Delhi, ISBN: 9780070699670
4. Bhattacharya, S.K., Electrical Machines, McGraw Hill Education, New Delhi,ISBN:9789332902855

Reference Books:

1. Mehta, V.K. and Mehta, Rohit, Principles of Electrical Machines, S. Chand and Co. Ltd., New Delhi, ISBN: 9788121930888
2. Theraja, B.L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Del- hi, ISBN: 9788121924375
3. Bandyopadhyay, M. N., Electrical Machines Theory and Practice, PHI Learning Pvt. Ltd., New Delhi, ISBN: 9788120329973 Vi
4. Murugesh Kumar, K., DC Machines and Transformers, ISBN: 9788125916055

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Principles of Electrical Wiring, Design and Drawing

DEE- C 305

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To learn about basic engineering instruments.
- To have knowledge of sheet layout.
- To learn dimensioning and reading of sketches.
- To learn orthographic and isometric views of drawing.

UNIT I

Symbols – Various Electrical Symbols used in Domestic and Industrial Installation and Power System (Generation Transmission and Distribution including substation)

UNIT II

Electrical Wiring: Wiring diagram of light, fan, bell and alarm circuit, Staircase and go down wiring

UNIT III

House Wiring: Concept of standard house wiring procedure and best practices.

UNIT IV

Electrical Fixtures: Right procedure of handling of electrical fixtures, Use of ladders, scaffolds, PPEs, shock resistance gloves during working/ performing tests in a live circuit Use of power drill machine and selection of drill bit for drilling works, Use of different common electrical hand and power tools.

UNIT V

Draw single line diagram of substation- Single line diagram of 33/11kV distribution substation, Single line diagram of a 11/0.4 kV distribution substation, Earthing.

Course Outcomes: After completing this course the students shall understand the following points:

- Have knowledge of engineering instruments.
- Learns lines and symbols of drawing.
- Learns freehand sketching.
- Understands projections of drawing.

Text Books:

1. Engineering Drawing by KK Dhiman, Ishan Publications, Ambala, Haryana.
2. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House, Anand, Gujrat.

Reference Books:

1. A Text Book of Engineering Drawing by Surjit Singh published by Dhanpat Rai and Co., Gill published by Delhi.
2. Engineering Drawing by PS SK Kataria and sons, Delhi.
3. Engineering Drawing by RB Gupta published by Satya Prakashan, New Delhi.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical Circuits Laboratory

DEE-C 351

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

LIST OF EXPERIMENTS

1. Verification of principle of Thevenin's theorem with A.C. source.
2. Verification of principle of superposition theorem with A.C. source.
3. Verification of principle of Norton's theorem with A.C. source.
4. Verification of principle of Maximum power transfer theorem with A.C. source.
5. Use voltmeter, ammeter to determine current through the given branch of an electric network by applying mesh analysis with A.C. source.
6. Use voltmeter, ammeter to determine current through the given branch of an electric network by applying node analysis with A.C. source.
7. Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L series circuit. Draw phasor diagram.
8. Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-C series circuit. Draw phasor diagram.
9. Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C series circuit. Draw phasor diagram.
10. Use variable frequency supply to create resonance in given series R-L-C circuit or by using variable inductor or variable capacitor.
11. Use voltmeter, ammeter, wattmeter to determine current, p.f., active, reactive and apparent power in R-C parallel A.C. circuit.
12. Use voltmeter, ammeter, wattmeter, p.f meter to determine current, p.f., active, reactive and apparent power for given R-L-C parallel circuit with series connection of resistor and inductor in parallel with capacitor.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical and Electronics Measurement Laboratory

DEE- C 352

MM: 100
TIME: 2 Hrs.
L T P
0 0 2

SESSIONAL: 30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. Identify measuring instruments on the basis of symbols on dial, type, accuracy, class position and scale.
2. Identify the components of PMMC and MI instruments.
3. Use two watt-meters for measuring active power of three-phase balanced load.
4. Troubleshoot single phase electronic energy meter.
5. Use digital multi-meter for measurement of AC/DC current, AC/DC voltage.
6. Use Kelvin's double bridge for measurement of low resistance.
7. Use voltmeter and ammeter method for measurement of medium resistance.
8. Use Megger for insulation resistance measurements.
9. Use earth tester for measurement of earth resistance.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electric Motors and Transformers Laboratory
DEE- C 353

MM:100
TIME: 3 Hrs
L T P
0 0 2

SESSIONAL:30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. Perform brake test on DC shunt motor.
2. Control the speed of DC shunt motor by different methods.
3. Control the speed of DC series motor by different methods.
4. Perform the brake test on DC series motor.
5. Check the functioning of single phase transformer.
6. Determine regulation and efficiency of single phase transformer by direct loading.
7. Perform open circuit and short circuit test on single phase transformer to determine equivalent circuit constants, voltage regulation and efficiency.
8. Perform parallel operation of two single phase transformers to determine the load current sharing.
9. Perform parallel operation of two single phase transformers and determine the apparent and real power load sharing.
10. Perform polarity test on a single phase transformer whose polarity markings are masked.
11. Perform phasing out test on a three phase transformer whose phase markings are masked.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical Workshop

DEE-C 354

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

LIST OF EXPERIMENTS

1. Familiarization of Electrical wiring accessories.
2. Dismantle and assemble following domestic:
   a. Iron box
   b. Mixer grinder/ Power drilling machine.
   c. Single phase motor.
   d. Ceiling and table fans.
3. Conduct soil resistivity test using an earth tester.
4. Carry out rigid PVC surface conduit wiring which contains Main switch, RCCB. Fuses (MCB), and sub circuits for light load and power load and control switches.
5. Familiarization with soldering and desoldering practice.
   Test the working of fluorescent lamps (with electromagnetic and electronic ballast).
6. Use common testing instruments used in electrical workshops:
   a. Test lamp
   b. line tester
   c. Multimeter
   d. Clamp-on meter
   e. Megger.
7. Understand the safety precautions to be observed in workshop and learn about safety procedures of first aid in case of electrical hazards.
8. Connect different domestic appliances to power supply and measure current drawn by them using a) Ammeter b) Tong tester c) Multimeter.
9. Know the working of various electrical circuit protective devices (Relay).
10. Identify and specify different types of conducting, insulating materials, resistors, capacitors and inductors as per standard color code practice.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Seminar

DEE-C 360

MM: 50
Time: 2Hr
L T P
0 0 2

Sessional: 15
ESE: 35
Credit: 1

Objectives: To increase the communication ability of students and to prepare them For presenting seminar on advanced topic of their branch.

The students will be required to deliver a seminar on a topic of general interest in or any advanced technical topics related to the theory paper studied. The topic will be decided by mutual consent of the faculty In-Charge and students

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ELECTRIC POWER TRANSMISSION AND DISTRIBUTION
DEE-C 401

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To understand the proper functioning of the electrical transmission and distribution systems.
- To make students capable of analysis of mechanical and electrical design aspects of transmission system.
- To learn Policies/Acts/Tariff related with Power Transmission &Distribution projects will be discussed and taught region wise in India.

UNIT I

Basics of Transmission and Distribution: Single line diagrams with components of the electric supply transmission and distribution systems. Classification of transmission lines: Primary and secondary transmission; standard voltage level used in India

UNIT II

Transmission Line Parameters and Performance: Line Parameters: Concepts of R, L and C of line parameters and types of lines. Skin effect and proximity effect.

UNIT III

Overhead Conductors- Properties of material, types of conductors with trade names, significance of sag. **Line supports-** Requirements, types of line structures and their specifications. **Line Insulators-** Properties of insulating material, types of insulators and their applications, causes of insulator failure, string efficiency.

UNIT IV

AC Distribution System: AC distribution: Components classification, requirements of an ideal distribution system, primary and secondary distribution system. Feeder and distributor, factors to be considered in design of feeder and distributor.

UNIT V

Extra High Voltage Transmission: Extra High Voltage AC (EHVAC) transmission line: Necessity, advantages, limitations and applications. Ferranti and Corona effect.
High Voltage DC (HVDC) Transmission Line- Necessity, components, advantages, limitations and applications.

Course Outcomes: After completing this course the students shall understand the following points:

- To interpret the normal operation of the electric transmission and distribution systems.
- To maintain the functioning of the medium and high voltage transmission system.
- To analyse the functioning of the low voltage AC distribution system.
- To understand the components of the transmission and distribution lines.

Text Books:

1. .C. Garg, Utilization of Electric Power & Electric Traction, Khanna Book Publishing Co., New Delhi (ISBN: 978-93-86173-355)
2. Mehta, V.K., Principles of Power System, S. Chand and Co. New Delhi, ISBN: 9788121924962
3. Soni;Gupta; Bhatnagar, A Course in Electrical Power, Dhanpat Rai and Sons New Delhi, ISBN: 9788177000207
4. Gupta,J.B., A Course in Power Systems, S.K. Kataria and sons, New Delhi, ISBN: 9788188458523
5. Theraja, B.L.; Theraja, A.K., A Textbook of Electrical Technology Vol. III, S.Chand and Co. New Delhi, ISBN : 9788121924900

Reference Books:

1. Uppal,S.L., A Course in Electrical Power, S.K.Khanna Publisher New Delhi, ISBN : 9788174092380.
2. Sivanagaraju S.; Satyanarayana S., Electrical Power Transmission and Distribution, Pearson Ed- ucation, New Delhi, , ISBN:9788131707913.
3. Ned Mohan, Electrical Power System: A First Course, Wiley India Pvt. Ltd. New Delhi, ISBN:9788126541959.
4. Gupta, B.R., Power System Analysis and Design, S. Chand and Co. New Delhi, ISBN: 9788121922388.
5. Kamraju, V., Electrical Power Distribution System, Tata McGraw-Hill, New Delhi, ISBN:9780070151413.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ELECTRONIC DEVICES AND CIRCUITS
DEE-C 402 / DET-C 402

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To introduce basic semiconductor devices, their characteristics and application.
- To understand analysis and design of simple diode circuit.
- To learn to analyze the PN junction behavior at the circuit level and its role in the operation of diodes and active device.

UNIT I

Semiconductor and Diodes: Definition, Extrinsic/Intrinsic, N-type & p-type PN Junction Diode – Forward and Reverse Bias Characteristics Zener Diode – Principle, characteristics, construction, working Diode Rectifiers–Half Wave and Full Wave, Filters–C, LC and PI Filters.

UNIT II

Bipolar Junction Transistor(BJT): NPN and PNP Transistor – Operation and characteristics Common Base Configuration – characteristics and working Common Emitter Configuration–characteristics and working Common Base Configuration – characteristics and working, small signal model of BJT.

UNIT III

Field Effect Transistors: FET–Working Principle, Classification MOSFET Small Signal model N-Channel/P-Channel MOSFETs–characteristics, enhancement and depletion mode, MOS-FET as a Switch, Common Source Amplifiers, Uni-Junction Transistor–equivalent circuit and operation.

UNIT IV

SCR : SCR – Construction, operation, working, characteristics, Amplifiers: BJT Classification of amplifiers, Feedback Amplifiers–Properties of negative Feedback,

UNIT V

Oscillators:. Berhausen criterion for oscillation, Hartley, Colpitts and Crystal oscillator

Course Outcomes: After completing this course the students shall understand the following points:

- Ability to analyze PN junctions in semiconductor devices under various conditions.
- Ability to design and analyze simple rectifiers and voltage regulators using diodes.
- Ability to describe the behavior of special purpose diodes.
- Ability to design and analyze simple BJT and MOSFET circuits.

Text Books:

1. Electronic Devices and Circuits McGraw Hill Education; Fourth edition, S. Salivahanan and N. Suresh Kumar.
2. Electronic Devices and Circuits Pearson Educationn India, first edition, Boyestad and nashelsky.
3. Electronic Devices and Circuits McGraw Hill Education; Fourth edition, Jacob Millman.

Reference Books:

1. Adel S Sedra, Kenneth C Smith and Arun N Chandorkar, "Microelectronic Circuits – Theory and Applications", Seventh Edition, Oxford University Press, 2017.
2. Robert L Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Eleventh Edition, Pearson India Education Services Pv Ltd., 2015.
3. Donald A Neamen, "Electronic Circuits – Analysis and Design", Third Edition, McGraw Hill Education, 2006.
4. Albert Malvino and David Bates, Electronic Principles, Eighth Edition, McGraw Hill Education, 2016.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ESTIMATING AND COSTING IN ELECTRICAL ENGINEERING
DEE-C 403

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To design electrical installation with costing for tendering Course contents.
- To make students capable of analysis of mechanical and electrical design aspects of System.
- To learn Policies/Acts/Tariff related with Power Transmission & Distribution projects will be discussed and taught region wise in India.

UNIT I

Electric Installation and Safety: Scope and features of National electric code 2011 Types of electrical installation

UNIT II

Fundamental principles: Basics for electrical installation Permit to work, safety instructions and safety practices Purpose of estimating and costing.

UNIT III

Estimation and Costing: Meaning and purpose of- Rough estimate, detailed estimate, supplementary estimate, annual maintenance estimate and revised estimate Factors to be considered while preparation of detailed estimate and economical execution of work

UNIT IV

Industrial Installations-I: Concept of Industrial load, Concept of Motor wiring circuit and single line diagram, Important guidelines about power wiring and Motor wiring, Design consideration of Electrical Installation in small Industry/Factory/workshop -- Office buildings, shopping and commercial centre

UNIT V

Non-Industrial Installations-II: Residential installation, Electric service and supply Design consideration of electrical installation in commercial buildings.

Course Outcomes: After completing this course the students shall understand the following points:

- Follow National Electrical Code 2011 in electrical installations.
- Estimate the electrical installation works 193 Electrical Engineering Curriculum Structure.
- Estimate the work of non-industrial electrical installations. d) Estimate the work of industrial electrical installations.
- Prepare abstract, tender, quotation of public lighting and other installations.
- Prepare abstract, tender, quotation of low tension (LT) substations.

Text Books:

1. Raina, K.B.; Dr. S. K. Bhattacharya New Age International Publisher First, Reprint 2010, Electrical Design Estimating and Costing ISBN: 978-81-224-0363-3
2. 2. Allagappan,, N. S. Ekambarram, Tata Mc-Graw Hill Publishing Co. Ltd, Electrical Estimating and Costing, ISBN 13: 9780074624784
3. 3. Singh, Surjit Ravi Deep Singh, Dhanpat Rai and Sons, Electrical Estimating and Costing. ISBN 13:1234567150995

Reference Books:

1. Gupta, J.B. S.K. Katariaand Sons Reprint Edition, A Course in Electrical Installation Estimating and Costing ISBN 10: 935014279113: 978-9350142790.
2. Bureau of Indian Standard. IS: 732-1989, Code of Practice for Electrical Wiring Installation
3. Bureau of Indian Standard. SP-30:2011, National Electrical Code 2011

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ADVANCED COURSE IN MACHINES

DEE-P 404

SESSIONAL:30
ESE: 70
CREDITS: 3

MM:100
TIME: 2 Hrs
L T P
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To provide basic knowledge of the different elements and concepts of electrical Machines
- To address the underlying A C Machines.
- To study transformer construction, operation, various tests, efficiency and voltage regulation.

UNIT I

Introduction to Electrical Machines: Definition of motor and generator, Torque development due to alignment of two fields and the concept of torque angle, Electro-magnetically induced emf, Elementary concept of an electrical machine, Comparison of generator and motor , Generalised theory of electrical machines.

UNIT II

Principles of Electro-mechanical Energy Conversion: Introduction, Flow of Energy in Electromechanical Devices, Singly Excited Systems; determination of mechanical force, mechanical energy, torque equation , Doubly excited Systems; electromagnetic torque , Generated EMF in machines; torque in machines.

UNIT III

Transformer-I: Review of Single-phase transformer, three phase transformer Construction, Three – phase unit transformer and Bank of three single phase transformers with their advantages.

UNIT IV

Transformer-II : All day efficiency, Sumpner's test , polarity test Excitation Phenomenon in Transformers, Parallel operation and load sharing of Single phase and three phase transformers. Auto Transformer: Single phase Auto transformer

UNIT V

Rotating AC machines: Types of AC rotating machines, Torque and EMF equation of machines, advantage disadvantages and applications

Course Outcomes: After completing this course the students shall understand the following points:

- The principle of operation and the effect of pulsating, rotating magnetic fields on the working of AC machines
- The armature winding layouts and concept of armature reaction with phasor diagrams.
- The staring, speed control methods and equivalent circuit diagram of poly phase and single phase machines.

Text Books:

1. D.P.Kothari & I.J. Nagrath, Electric Machines, Tata Mc Graw Hill.
2. P.S. Bimbhra Generalized Theory of Electrical Machines, Khanna Publishers.
3. Fitzerald, A.E., Kingsley and S.D.Umans, Electric Machinery, MC Graw Hill

Reference Books:

1. P.S. Bimbhra, Electrical Machines, Khanna Publisher.
2. M. G. Say, Alternating Current Machines, Pitman & Sons.
3. O.C. Taylor, The performance & design of A.C. Commutator Motors, A.H. Wheeler & Co(P) Ltd

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

POWER PLANT ENGINEERING

DEE- P 405

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Understand the energy demand & supply conditions & appreciate the importance of non-conventional
- energy sources.
- Understand Solar energy, its features & its applications.
- Understand Wind energy, its mechanisms & applications.
- Understand the Ocean thermal & Tidal energy, their features, mechanisms & applications.
- Understand the Geothermal & hydro thermal energy, its mechanism & applications.
- Understand the concepts of Direct Energy Conversion systems & their applications.
- Understand the concepts of Energy Storage & applications.

UNIT I

Fundamentals of Energy Systems: Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT II

Solar Thermal Systems Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity – Product collector efficiency factor – Collector heat removal factor – Numerical problems – Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT III

Solar Photovoltaic Systems: Balance of systems – IV characteristics – System design: Storage sizing, PV system sizing, Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT IV

Wind Energy: Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – efficiency – Power output of wind turbine – Selection of generator (synchronous, induction) – Maximum power point tracking.

UNIT V

Hydro and Tidal power systems: Basic working principle Classification of hydro systems: large, small, micro – Measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

Course Outcomes: After completing this course the students shall understand the following points:

- Understand the basic concepts and operation of renewable energy systems.
- Remember the ideas and statistics of current RES availability and usage.
- Analyze the working of hydro and tidal power systems installation in real time.
- Analyze Solar energy, its features & its applications.

Text Books:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.
3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books:

1. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
3. Renewable energy technologies – A practical guide for beginners -- Chetong Singh Solanki, PHI.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

NEURAL FUZZY AND CONTROL

DEE-P 406

SESSIONAL:30
ESE: 70
CREDITS: 3

MM:100
TIME: 2 Hrs
L T P
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec. B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Get the exposure to Artificial Neural Networks & Fuzzy Logic.
- Understand the importance of tolerance of imprecision and uncertainty for design of robust & low cost intelligent machines.

UNIT I

Introduction to Artificial Neural Network: Artificial neural networks and their biological motivation: Terminology, Models of neuron, Topology, characteristics of artificial neural networks, types of activation functions; learning methods: error correction learning, Hebbian learning, Perceptron: XOR Problem, Perception learning rule convergence theorem; Adaline.

UNIT II

Feed-forward and Recurrent Neural Networks: Architecture: perceptron model, solution, single layer artificial neural network, multilayer perceptron model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting back propagation training, applications; Recurrent neural networks: Linear auto associator – Bi-directional associative memory – Hopfield neural network.

UNIT III

Fuzzy Logic & Fuzzy Sets: Introduction to Fuzzy Logic, Classical and Fuzzy Sets, Membership Function ,Membership Grade, Universe of Discourse, Linguistic Variables, Operations on Fuzzy Sets: Intersections, Unions, Negation, Product, Difference, Properties of Classical set and Fuzzy sets, Fuzzy vs Probability, Fuzzy Arithmetic, Fuzzy Numbers.

UNIT IV

Fuzzy Relations & Aggregations: Essential Elements of Fuzzy Systems, Classical Inference Rule, Classical Implications and Fuzzy Implications, Crisp Relation and Fuzzy Relations, Composition of fuzzy relations, Cylindrical Extension and Projection. Fuzzy IF-THEN rules, Inference: Scaling and Clipping Method, Aggregation, Fuzzy rule based Model: Mamdani Model, TSK model, Fuzzy Propositions, De-fuzzification: MOM, COA

UNIT V

Fuzzy Optimization and Neuro-Fuzzy Systems: uzzy optimization –one-dimensional optimization. Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks motors, AC and DCservomotors, Torque speed characteristics of above motors.

Course Outcomes: After completing this course the students shall understand the following points:

- Identify and describe Fuzzy Logic and Artificial Neural Network techniques in building intelligent machines
- Apply Artificial Neural Network & Fuzzy Logic models to handle uncertainty and solve engineering problems.
- Recognize the feasibility of applying a Neuro-Fuzzy model for a particular problem

Text Books:

1. Ross, Timothy J. Fuzzy logic with engineering applications. John Wiley & Sons, 2009.
2. Yegnanarayana, B. Artificial neural networks. PHI Learning Pvt. Ltd., 2004.

Reference Books:

1. Zurada, Jacek M. Introduction to artificial neural systems, West St. Paul, 1992.
2. Hagan, Martin T., Howard B. Demuth, and Mark H. Beale. Neural network design. Boston: Pws Pub., 1996.
3. Haykin, Simon. Neural networks: a comprehensive foundation. Prentice Hall PTR, 1994.
4. Passino, Kevin M., and Stephen Yurkovich. Fuzzy control. Vol. 42. Menlo Park, CA: Addison-Wesley, 1998.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Installation and Maintenance of Electrical Equipment
DEE- P 407

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives: The course objective is to;

- To study the tools and accessories used in system.
- To study the installation of line, equipment and testing.
- To study the maintenance of line and equipment.

UNIT I

Tools and Accessories: Tools, accessories and instruments required for installation, maintenance and repair work. Knowledge of Indian Electricity rules, safety codes, causes and prevention of accidents, artificial respiration of an electrocuted person, workmen's safety devices.

UNIT II

Installation of Line: Installation of transmission and Distribution Lines: Erection of steel structures, connecting jumpers, tee-off points, joints and dead ends; crossing of roads, streets, power/telecommunication lines and railway line crossings, clearances; earthing of transmission lines and guarding, spacing and configuration of conductors: Arrangement for suspension and strain insulators, bird guards, anti-climbing devices and danger plates; sizes of conductor, earthwire and guy wires, Laying of service lines, earthing, provision of service fuses, installation of energy meters.

UNIT III

Installation of Equipment: Elementary idea regarding, inspection and handling of transformers; pole mounted substations, plinth mounted substations, grid substation, busbars, isolators, voltage and current transformers, lightning arrestors, control and relay panels, HT/LT circuit breakers, LT switches, installation of power/distribution transformers, dehydration. Earthing system, fencing of yard, equipment foundations and trenches etc.

UNIT IV

Testing:- Testing of various electrical equipment such as electrical motor, transformers, cables, and generators, motor control centres, medium voltage distribution panels, power control centres, motor control centres, lighting arrangement, storage, pre-installation checks, connecting and starting, pre-commissioning checks, drying out, oil testing of transformers.

UNIT V

Maintenance of Equipment: Maintenance of Distribution Transformers: Transformer maintenance and points to be attended to in respect of various items of equipment Checking of insulation resistance, transformer oil level, measurement of earth resistance.
Maintenance of Motors: Over hauling of motors, preventive maintenance, trouble shooting of electric motors

Course Outcomes: After completing this course the students shall understand the following points:

- To know the Erect/install various electrical equipment as per IE Rules Act by adopting all safety measures.
- Prepare specifications for different items required for transmission lines.
- To Know Design and excavation of cable trenches.
- Study the Lay underground cables.

Text Books:

1. Praveen Kumar, Installation and Maintenance of Electrical Equipment, North Publication, Jalandhar
2. Madhvi Gupta, Installation Maintenance and Repair of Electrical Machines and Equipments. S.K. Kataria & Sons; 2014th edition.
3. SK Sharotri. Preventive Maintenance of Electrical Apparatus, Katson Publishing House, Ludhiana

Reference Books:

1. S Rao, Testing, Commissioning, Operation and Maintenance of Electrical Equipment, Khanna Technical Publication, New Delhi.
2. Tarlok Singh Installation Commissioning & Maintenance Of Electrical Equipments, S.K. Kataria & Sons; Reprint 2013 edition.
3. Gupta P P, Installation, Commissioning and Maintenance of Electrical Equipment, Dhanpat Rai Publications (P) Ltd.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electric Power Transmission and Distribution Laboratory

DEE- C 451

MM: 100
TIME: 2 Hrs.
L T P
0 0 2

SESSIONAL: 30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. To study the performance of a long transmission line under no load & light loadconditions.
2. To study phase displacement between the current & voltage at input of line usingtransmission line trainer kit.
3. Measurement of input impedance and attenuation of transmission line usingtransmission line trainer kit.
4. Measurement of characteristics of transmission using transmission line trainer kit.
5. To find the resistivity of the earth using a hand driven earth tester.
6. To study the performance characteristics of a typical D.C. distribution system (RadialConfiguration).
7. To determine the ABCD parameters of transmission line.
8. To determine the h parameters and Image parameters of transmission line.
   i) To plot the equipotential line of paper model of multiple layer cable.
   ii) To plot electric stress distribution in a paper model of multiple layer cable.
9. To determine the voltage distribution across a string insulator and calculate stringefficiency.
10. To test the breakdown voltage of the transformer oil by transformer oil testing set.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electronic Devices and Circuits Laboratory

DEE- C 452 / DET-C 452

MM: 100
TIME: 2 Hrs.
L T P
0 0 2

SESSIONAL: 30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. To draw the V-I characteristics of PN junction diode.
2. To draw the V-I characteristics of Zener diode and study it as voltage regulator.
3. To study junction diode as half wave and full wave rectifier.
4. To draw the input and output characteristics of a transistor in CE and CB configuration.
5. To draw the input and output characteristics of FET and to measure the pinch off voltage.
6. To draw the drain and transfer characteristic curve of MOSFET.
7. To draw the frequency response of FET amplifier.
8. To find the frequency of crystal Oscillator.
9. To find the frequency of Hartley Oscillator
10. To find the frequency of Colpitts Oscillator

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

AC Machines Laboratory

DEE- C 453

MM:100
TIME: 2 Hrs
L T P
0 0 2

SESSIONAL:30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. Load test on single phase transformer.
2. SC and OC test on single phase transformer.
3. Polarity and turns ratio test.
4. Banking of transformers.
5. Dismantle and assembling of dol and star-delta starter.
6. To study polarity and ratio test of single phase transformer.
7. To perform open circuit and short circuit tests on a single-phase transformer and determine parameters of equivalent circuit.
8. To perform open circuit and short circuit tests on a three- phase transformer and determine parameters of equivalent circuit.
9. To obtain 3-phase to 2-phase conversion by Scott connection.
10. To obtain efficiency and voltage regulation of a single phase transformer by load test.
11. To perform Sumpner's test (back-to-back) on single-phase transformers.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

CONTROL SYSTEMS

DEE- C 501

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Maintain Industrial Automation Systems.
- Learn the basics of automation, how systems work and the importance of PLC, SCADA and robots in automation.
- This course will provide an opportunity to learn industrial automation techniques..

UNIT I

Control System: Types of control system, open loop and close loop system, components and the circuit, brief description and application in industry, idea about automation

UNIT II

Block Diagram and Signal Flow Graphs: Transfer Functions, Block diagram algebra and signal flow graphs.

UNIT III

Time Response of Feedback Control Systems: Standard test signals, Unit step response of first and second order system, Time response specifications of second order systems, Steady state errors and error constants.

UNIT IV

Transducers: Theory, types of transducers construction and use of various transducers like resistance, inductance, capacitance, electromagnetic, piezoelectric type

UNIT V

Measurements: Importance of measurement, Basic measuring systems, advantages and limitations of each measuring systems, generalized measurement system, process and process variables

Course Outcomes: After completing this course the students shall understand the following points:

- Explain automation components and systems application.
- Interface I/O devices with the PLC modules.
- Develop PLC ladder programs for various applications.
- Select the suitable motor drives for different applications
- Identify suitable industrial automation hardware for given application

Text Books:

1. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies.
2. Process Control Instrumentation Technology By. C.D. Johnson, PHI
3. Programmable logic controller, Dunning, Delmar

Reference Books:

1. Stenerson Jon, Industrial automation and Process control, PHI Learning, New Delhi, 2003, ISBN : 9780130618900
2. Mitra, Madhuchandra; Sengupta, Samarjit, Programmable Logic Controllers and Industrial Automation - An introduction, Penram International Publication, 2015, ISBN: 9788187972174
3. Boyar, S. A., Supervisory Control and Data Acquisition, ISA Publication, USA, ISBN: 978-1936007097
4. Bailey David ; Wright Edwin, Practical SCADA for industry, Newnes (an imprint of Elsevier), UK 2003, ISBN:0750658053

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Industrial Power Electronics

~~INDUSTRIAL ELECTRONICS AND CONTROL OF DRIVES~~

DEE-C 502

SESSIONAL:30
ESE: 70
CREDITS: 3

MM:100
TIME: 3 Hrs
L T P
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Maintain the proper functioning of power electronic devices.
- To learn a number of power electronics circuit analysis techniques in trending projects.

UNIT I

Power Electronic Devices: Power electronic devices Power Diode, Power transistor: construction, working principle, V-I characteristics and uses. IGBT: Construction, working principle, V-I characteristics and uses. Concept of single electron transistor (SET) - aspects of Nano- technology.

UNIT II

Thyristor Family Devices: SCR construction, two transistor analogy, types, working and characteristics. Types of Thyristors: SCR, GTO, UJT, DIAC and TRIAC Thyristor family devices: symbol, construction, operating principle and V-I characteristics, Protection circuits: over-voltage, over-current, Snubber, Crowbar.

UNIT III

Turn-on and Turn-off Methods of Thyristors: SCR Turn-On methods: High Voltage thermal triggering. Illumination triggering, dv/dt triggering, Gate triggering. Gate trigger circuits – Resistance and Resistance-Capacitance circuits, Pulse transformer and opto-coupler based triggering. SCR Turn-Off methods. Diode Rectifiers.

UNIT IV

Phase Controlled Rectifiers Phase control: firing angle, conduction angle. Single phase half controlled, full controlled and midpoint controlled rectifier with R, RL load: Circuit diagram, working, input- output waveforms, equations for DC output and effect of freewheeling diode. Electrical Engineering Different configurations of bridge controlled rectifiers: Full bridge, half bridge.

UNIT V

Industrial Control Circuits Applications: Burglar's alarm system, Battery charger using SCR, Emergency light system, Temperature controller using SCR and; Illumination control / fan speed control TRIAC.

Course Outcomes: After completing this course the students shall understand the following points:

- Select power electronic devices for specific applications.
- Maintain the performance of Thyristors.
- Troubleshoot turn-on and turn-off circuits of Thyristors.
- Maintain phase controlled rectifiers.
- Maintain industrial control circuits.

Text Books:

1. Ramamoorty M., An Introduction to Thyristors and their applications, East-West Press Pvt. Ltd., New Delhi, ISBN: 8185336679.
2. Sugandhi, Rajendra Kumar and Sugandhi, Krishna Kumar, Thyristors: Theory and Applications, New Age International (P) ltd. Publishers, New Delhi, ISBN: 978-0-85226-852-0.
3. Bhattacharya, S.K., Fundamentals of Power Electronics, Vikas Publishing House Pvt. Ltd. Noida. ISBN: 978-8125918530.
4. Jain & Alok , Power Electronics and its Applications, Penram International Publishing (India) Pvt. Ltd, Mumbai, ISBN: 978-8187972228.
5. Rashid , Muhammad, Power Electronics Circuits Devices and Applications, Pearson Education India, Noida, ISBN: 978-0133125900.

Reference Books:

1. Singh, M. D. and Khanchandani, K.B., Power Electronics, Tata McGraw Hill Publishing Co. Ltd, New Delhi, 2008 ISBN: 9780070583894.
2. Zbar, Paul B., Industrial Electronics: A Text –Lab Manual, McGraw Hill Publishing Co. Ltd., New Delhi, ISBN: 978-0070728226.
3. Grafham D.R., SCR Manual, General Electric Co., ISBN: 978-0137967711.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

DIGITAL ELECTRONICS AND MICROPROCESSOR

DEE-C 503 / DET-C 503

SESSIONAL:30
ESE: 70
CREDITS: 3

MM:100
TIME: 3 Hrs
L T P
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To acquire the basic knowledge of digital logic levels and application of knowledge
- to understand digital electronics circuits.
- To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

UNIT I

Introduction to different number systems: Number Systems & Boolean Algebra, Binary, Octal, Decimal, Hexadecimal Conversion from one number system to another, Addition, Subtraction, 1's 2's Complement, Boolean variables: Rules and laws of Boolean Algebra, De-Morgan's Theorem.

UNIT II

Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR: Symbolic representation and truth table Implementation of Boolean expressions and Logic Functions using gates Simplification of expressions. Karnaugh Maps and their use for simplification of Boolean expressions.

UNIT III

Combinational Logic Circuits: Arithmetic Circuits –Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel and Series Adders Encoder, Decoder, Multiplexer 2to1MUX, 4to1MUX, 8to1MUX. Applications De-multiplexer– 1to2 DEMUX, 1-4 DEMUX, 1-8 DEMUX.

UNIT IV

Fundamentals of Microprocessors: Fundamentals of Microprocessor , Microprocessor 8085 architecture, Addressing modes, Instruction set, and programming techniques, timing diagram, time delay and counter. . Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

UNIT V

Memory and I/O Interfacing: Introduction to 8051 microcontroller, pin diagram, architecture, Addressing modes, ~~timer/counter,~~ interrupts.

Course Outcomes: After completing this course the students shall understand the following points:

- Apply knowledge and demonstrate programming proficiency using the various addressing
- Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
- Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
- Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
- Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
- Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

Text Books:

1. Microprocessor, architecture, programming and applications with 8085 R.S Gaonkar
2. 8051 microcontroller architecture programming and applications-K. J Ayala

Reference Books:

1. Modern Digital Electronics, 2nd Edition, R.P. Jain. Tata Mc Graw Hill Company Limited.
2. Digital circuits and design,4th editionn,S. Salivahanan& S. Arivazhagan,Vikas Publising House Pvt. Ltd.
3. Digital Electronics and integrated circuits, 2nd edition, Soumitra Kr. Mandal, Mc Graw Hill Company.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

SUBSTATION SWITCHGEAR AND PROTECTION

DEE- P 504

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives: The course objective is to;

- Maintain switchgear and protection schemes used in electrical power systems.

UNIT I

Substation: Different Type of Sub-stations, Layout, single line diagram, busbar arrangement, equipment, their fuctions, accessories, study of protective schemes, batteries and their maintenance, operation of small sub-stations.

UNIT II

Faults: Types of faults, three phase symeterical faults, effects of faults on system reliability and stability, abnormalities, short circuits and their effects, representation of fault conditions through single line diagrams.

UNIT III

Switchgear: Purpose of protective gear, characteristics of a protection system, Classification and selection of fuses with application and working, Isolators and switches functions, air break switches, braking capacity of switches, Circuit breakers :- types of circuit-breakers, requirements of circuit breakers, reasons for arc formation, principles of arc, extinction, comparison with oil circuit breaker, classification and specification of circuit breakers, rating of circuit breakers, working of different types of air and oil circuit breakers, maintenance schedule, SF6 and Vacuum circuit breakers.

UNIT IV

Protective Schemes: Protection of alternators: stator faults, rotor faults, mechanical conditions, external faults - their reasons, effect and protections used.
Motor protection: types of faults and protection in motors, thermal relays, protection of small motors, under voltage protection.

UNIT V

Protection Against Over Voltages: Causes of over voltages, travelling waves earth wire, protective zone, lightening arrestors, space-gap and electrolytic arrestors, surge absorber, location and rating of lightening arrestors. Thyrite lightening arrestor.

Course Outcomes: After completing this course the students shall understand the following points:

- Identify various types of fault diagnosis
- Select suitable switchgears for different applications.
- Study and Know relay operation
- Study about protection schemes
- Know and study about different types of substations and read single line diagrams

Text Books:

1. Mehta V. K ;Rohit Mehta, Principles of Power System, S .Chand and Co., New Delhi., ISBN: 978-81-2192-496-2.
2. Rao.Sunil S., Switchgear and Protection, Khanna Publishers, New Delhi, ISBN: 978-81-7409-232-3.
3. Singh, R. P., Switchgear and Power System Protection, PHI Learning, New Delhi, ISBN: 978-81-203-3660-5.
4. Gupta. J. B.. Switchgear and Protection, S. K. Kataria and Sons, New Delhi, ISBN: 978-93-5014-372-8.

Reference Books:

1. Veerapan, N.,Krishnamurty, S. R., Switchgear and Protection, S .Chand and Co., New Delhi. ISBN: 978-81-2193-212-7.
2. Ram, Badri; Vishwakarma D. N., Power System Protection and Switchgear, McGraw-Hill, New Delhi. ISBN : 978-07-107774-X
3. Kathan Nagrath, Switchgear and Protection, TMH.
4. Soni Gupta &Bhatnagar, Switchgear and Protection, Dhanpat Rai & Sons.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ILLUMINATION PRACTICES

DEE-P 505

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Design illumination schemes and associated electrification of buildings.
- To understand the importance of illumination engineering in energy conservation.
- To guide students towards acquiring the knowledge regarding the fundamentals and elementary design aspects of artificial lighting.

UNIT I

Fundamentals of illumination: Basic illumination, Terminology, Laws of illumination, Polar curves, polar curve: its meaning and applications for designing the lamp. Concept of Photometry, Measurement of illumination, Lighting calculation methods, Watt /m2 method, Lumens or light flux method.

UNIT II

Types of Lamps: Incandescent lamp, ARC lamps – AC and DC arc lamps, fluorescent lamp, Types of other lamps: Mercury vapour lamp, HPMV lamp, Mercury iodide lamp, Sodium vapour lamp, Halogen Lamps, Ultraviolet Lamps, Neon Lamps. Neon Sign Tubes. Metal halides, HID and Arc lamps, LED lamps, CFL, Lasers Selection Criteria for lamps.

UNIT III

Illumination Control and Control Circuits: Purpose of lighting control, and Dimmer, Resistance type Salt water Dimmer Working principle and operation of Dimmer, Transformer and their types, Dimmer Transformer, Auto transformer dimmer, Two winding transformer dimmer, Electronic Dimmer: working principle and operation

1. Thyristor operated dimmer
2. Triac operated dimmer.

UNIT IV

Illumination for Interior Applications-I: Standard for various locations of Interior Illumination, Design considerations for Interior location of residences (1/2/3/4 BHK),

UNIT V

Illumination for Interior Applications-II: Factory Lighting, Street Lighting (Latest Technology), Flood Lighting Railway Lighting, Lighting for advertisement /Hoardings/sports lighting, Agriculture and Horticulture lighting, Health Care Centres / Hospitals, Decorating Purposes, Stage Lighting, Aquariums and Ship- yards.

Course Outcomes: After completing this course the students shall understand the following points:

- Select relevant lamps for various applications considering illumination levels
- Select the lighting accessories required for selected wiring scheme.
- Design relevant illumination schemes for interior applications.
- Design Illumination schemes for various applications
- Design Illumination schemes for various outdoor applications.

Text Books:

1. Lindsey, Jack L., Applied Illumination Engineering, The Fairmont Press Inc.
2. Simons, R. H., Bean, Robert; Lighting Engineering: Applied Calculations, Architectural Press. ISBN: 0750650516.
3. Casimer M Decusatis, Handbook of Applied Photometry, Springer, ISBN 1563964163.

Reference Books:

1. Butterworths, Lyons Stanley, Handbook of Industrial Lighting, Butterworths
2. Simpson Robert S, Lighting Control Technology and Applications, Focal Press
3. Kao Chen, Energy Management in Illuminating Systems, CRC Press

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

RENEWABLE ENERGY

DEE- O 505

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- The aim of this course is to helpthe student to attain the following industry identified competency through various teaching learning experiences:
- Maintain the efficient operation of various types of renewable energy power plants.

UNIT I

Solar PV and Concentrated Solar Power Plants: Solar Map of India: Global solar power radiation, Solar PV Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors Solar Photovoltaic (PV) power plant: components layout, construction, working. Rooftop solar PV power system

UNIT II

Large Wind Power Plants: Wind Map of India: Wind power density in watts per square meter Lift and drag principle; long path theory. Geared type wind power plants: components, layout and working. Direct drive type wind power plants: Components, layout and working.

UNIT III

Small Wind Turbines: Horizontal axis small wind turbine: direct drive type, components and working Horizontal axis small wind turbine: geared type, components and working, Vertical axis small wind turbine: direct drive and geared, components and working.

UNIT IV

Micro-hydro Power Plants: Energy conversion process of hydro power plant, Classification of hydropower plant: High, medium and low head. Layouts of micro-hydro power plants, Construction and working of hydro turbines used in different types of hydro power plant:

UNIT V

Biomass-based Power Plants: Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste. Properties of liquid and gaseous fuel for biomass power plants.

Course Outcomes: After completing this course the students shall understand the following points:

- Maintain the optimised working of solar PV and CS power plants.
- Maintain the optimised working of large wind power plants
- Maintain the optimised working of small wind turbines.
- Maintain the optimised working of micro hydro power plants.
- Maintain the optimised working of biomass-based power plants.

Text Books:

1. Deambi, Suncel: From Sunlight to Electricity: a practical handbook on solar photovoltaic applica- tion; TERI, New Delhi ISBN:9788179935736
2. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd - Renewable Energy Systems, Pearson Edu- cation New Delhi , ISBN: 9789332586826,
3. Rachel, Sthuthi; Earnest, Joshua – Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49- 3; E-book 978-93-88028-50-9
4. Khoiyangbam, RSNavindu; Gupta and Sushil Kumar; Biogas Technology: Towards Sustainable Development; TERI, New Delhi; ISBN: 9788179934043
5. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304

Reference Books:

1. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
2. Wizelius, Tore&Earnest, Joshua -PHI Learning, New Delhi, ISBN: 978-8120351660
3. Kothari, D.P. et al: Renewable Energy Sources and Emerging Technologies, PHI Learning, New Delhi, ISBN:-978-81-203-4470-9
4. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Oxford University Press, New Delhi, ISBN: 9780195670936.
5. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi (ISBN: 978-9386173- 683)

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

PROJECT MANAGEMENT

DEE- O 506

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives: The course objective is to;

- Practical applications of project management to formulate strategies allowing organizations to achieve strategic goals
- A perspective of leadership effectiveness in organizations
- Team-building skills required to support successful performance
- Skills to manage creative teams and project processes effectively and efficiently

UNIT I

Introduction to Project Management: Project Management, Professional Construction Management-Significance, objectives & functions of construction management, Types of construction, Resources for construction, Stages in construction. Construction team, Perception of- Client, Consultants and Contractor, Project Feasibility-Turnkey operation, BOOT, PPP.

UNIT II

Planning and Scheduling: Planning-Objectives, principles, Work breakdown structure, Stages of planning for construction projects. Pre-tender stage, Contract stage Scheduling – Necessity of scheduling, scheduling by bar charts, Preparation of construction schedule for labour, material, machine & finance.

UNIT III

Entrepreneurship Essentials: Concepts and Overview of Entrepreneurship, Evolution and Growth of Entrepreneurship in India, Role of Entrepreneurship in Economic Development, Framework of Entrepreneurship Theories Models of Entrepreneurship, Emerging Models of Corporate Entrepreneurship.

UNIT IV

Inspection and Quality Control:- Need for inspection &quality control Objectives, Principles of inspection, Enforcement of specifications, Stages of inspection &quality control, Technical services &inspection team, Testing of structures, Statistical analysis.

UNIT V

Safety in Construction: Importance of safety. Safety procedures and check list (excavation, scaffolding, form work) Safety meetings, Safety measures for storage, Safety in fabrication &erection, safety measures for demolition, Fire safety.

Course Outcomes: After completing this course the students shall understand the following points:

- Understand project characteristics and various stages of a project.
- Understand the conceptual clarity about project organization and feasibility analyses Market, Technical, Financial and Economic.
- Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
- Apply the risk management plan and analyse the role of stakeholders.
- Understand the contract management, Project Procurement, Service level Agreements and productivity.
- Understand the How Subcontract Administration and Control are practiced in the Industry.

Text Books:

1. Chaudhary S.; Project Management, Tata Mc Graw Hill
2. Kerzner H.; Project Management, II Edition, CBS Publishers.
3. Meredith Jack R., Mantel Samuel J.; Project Management, IV Edition, John Wiley & Sons

Reference Books:

1. Gopalakrishnan P., Ramamoorthy V.E; Textbook of Project Management, MacMillan Publishers.
2. Maylor Harvey, Project Management, MacMillan Publishers
3. Matheen A. Prof., Comprehensive Project Management, Laxmi Publication

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Control Systems Laboratory

DEE- C 551

MM:100
TIME: 2 Hrs
L T P
0 0 2

SESSIONAL:30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. Identify various automation systems available in different appliances/ devices/ machines in day today use.
2. Identify various parts of the given PLC and front panel status indicators.
3. Use PLC to test the START STOP logic using two inputs and one output.
4. To study the performance of Resistance Temperature Detector (RTD) & draw the following characteristics

i. Time vs. Temperature (for heating)
ii. Time vs. Temperature (for cooling)
iii. Temperature vs. Resistance of RTD

5. To study the performance of various types of controllers (P, PI, PID) used to control the temperature of an oven & find

i. Open loop response of oven & it's transfer function
ii. Closed loop response of oven using P, PI and PID controller.

6. To study and perform simple two step open loop control and proportional control on process control simulator kit.
7. Study of the characteristics of Linear System Simulator trainer kit.
8. To study the configuration and evaluate the performance characteristics of a feedback light intensity control system.
9. To study speed control of DC Servomotor using PID controller.
10. To Study the SCADA architecture/block diagram with applications.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

~~Industrial Electronics and Control of Drives Laboratory~~ Industrial Power Electronics Laboratory

DEE- C 552

MM: 100
TIME: 2 Hrs.
L T P
0 0 2

SESSIONAL: 30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. Test the proper functioning of power transistor.
2. Test the proper functioning of IGBT.
3. Test the proper functioning of DIAC to determine the break over voltage.
4. Determine the latching current and holding current using V-I characteristics of SCR.
5. Test the variation of R, C in R and RC triggering circuits on firing angle of SCR.
6. Test the effect of variation of R, C in UJT triggering technique.
7. Perform the operation of Class – A, B, C, turn off circuits.
8. Perform the operation of Class –D, E, F turn off circuits.
9. Use CRO to observe the output waveform of half wave controlled rectifier with resistive load and determine the load voltage.
10. Draw the output waveform of Full wave controlled rectifier with R load, RL load, freewheeling diode and determine the load voltage.
11. Determine the firing angle using DIAC and TRIAC phase controlled circuit on output power under different loads such as lamp, motor or heater.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Digital Electronics and Microprocessor Laboratory

DEE- C 553 / DET-C 553

MM:100
TIME: 2 Hrs
L T P
0 0 2

SESSIONAL:30
ESE: 70
CREDITS: 1

LIST OF EXPERIMENTS

1. To verify the truth tables of various types of gates using IC 7400.
2. To verify the truth tables of various types of gates using IC 7402.
3. To design & verify the truth table of half & full adder.
4. To verify the truth tables of Multiplexer & also implement a function using Multiplexer.
5. To verify the truth tables of De Multiplexer.
6. Addition of 8 bit hexadecimal numbers without carry.
7. To calculate 1' and 2's compliments of hexadecimal number.
8. Subtraction of two 8 bit hexadecimal number.
9. Multiplication of 8 bit hexadecimal number by 2.
10. Addition of two 8 bit decimal numbers.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

INDUSTRIAL AUTOMATION AND CONTROL
DEE-601

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:
The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- To understand the generic architecture and constituent components of a Programmable Logic Controller.
- To develop a software program using modern engineering tools and technique for PLC and SCADA.
- To apply knowledge gained about PLCs and SCADA systems to real-life industrial applications..

UNIT I

Introduction to Industrial Automation: Need and benefits. Types of automation system: Fixed, Programmable, Flexible Different systems used for Industrial automation: PLC, HMI, SCADA, DCS, Drives. Evolution of PLC.

UNIT II

PLC Fundamentals: Building blocks of PLC: CPU, Memory organization, Input- output modules (discrete and analog), Specialty I/O Modules, Power supply, Fixed and Modular PLC and their types, Redundancy in PLC module I/O module selection criteria, Interfacing different I/O devices with appropriate I/O modules.

UNIT III

PLC Programming and Applications: PLC I/O addressing PLC programming Instructions: Relay type instructions, Timer instructions: On delay, off delay, retentive, Counter instructions: Up, Down, High speed, Logical instructions, Comparison Instructions, Data handling Instructions, Arithmetic instructions.

UNIT IV

Electric Drives and Special machines: Electric drives: Types, functions, characteristics, four quadrant operation, DC and AC drive controls: V/F control, Parameters, direct torque control, Drives: Specifications, Applications- Speed control of AC motor /DC Motor.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

UNIT V

Supervisory Control and Data Acquisition System (SCADA): Introduction to SCADA: Typical SCADA architecture/block diagram, Benefits of SCADA, Various editors of SCADA, Interfacing SCADA system with PLC: Typical connection diagram.

Course Outcomes: After completing this course the students shall understand the following points:

- Identify different types of automation systems.
- Interface I/O devices with the PLC modules.
- Develop PLC ladder programs for various applications.
- Select the suitable motor drives for different applications
- Prepare simple SCADA applications.

Text Books:

1. Dunning, G., Introduction to Programmable Logic Controllers, Thomson /Delmar learning, New Delhi, 2005,ISBN 13 : 9781401884260
2. Jadhav, V. R., Programmable Logic Controller, Khanna publishers, New Delhi, 2017, ISBN : 9788174092281
3. Petruzella, F.D., Programmable Logic Controllers, McGraw Hill India, New Delhi, 2010, ISBN: 9780071067386
4. Hackworth, John; Hackworth, Federic, Programmable Logic Controllers, PHI Learning, New Delhi, 2003, ISBN : 9780130607188

Reference Books:

1. Stenerson Jon, Industrial automation and Process control, PHI Learning, New Delhi, 2003, ISBN : 9780130618900
2. Mitra, Madhuchandra; Sengupta, Samarjit, Programmable Logic Controllers and Industrial Automation - An introduction, Penram International Publication, 2015, ISBN: 9788187972174
3. Boyar, S. A., Supervisory Control and Data Acquisition, ISA Publication, USA, ISBN: 978-1936007097
4. Bailey David ; Wright Edwin, Practical SCADA for industry, Newnes (an imprint of Elsevier), UK 2003, ISBN:0750658053

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ENERGY CONSERVATION AND AUDITING

DEE-C 602

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Undertake energy conservation and energy audit.

UNIT I

Energy Conservation Basics: Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference, Indian Electricity Act 2001; relevant clauses of energy conservation, BEE and its Roles, MEDA and its Roles Star Labelling: Need and its benefits.

UNIT II

Energy Conservation in Electrical Machines: Need for energy conservation in induction motor and transformer. Energy conservation techniques in induction motor by: Improving Power quality, Motor survey, Matching motor with loading, Minimizing the idle and redundant running of motor, Operating in star mode, Rewinding of motor, Replacement by energy efficient motor.

UNIT III

Energy conservation in Electrical Installation systems: Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level. Technical losses, Commercial losses, Energy conservation equipment: Maximum Demand Controller, kVAR Controller, Automatic Power Factor controller (APFC), Energy Conservation in Lighting System, Energy Conservation techniques in fans, Electronic regulators.

UNIT IV

Energy conservation through Cogeneration and Tariff: Co-generation and Tariff; concept, significance for energy conservation, Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration, Reciprocating engine cogeneration), Factors governing the selection of cogeneration system, Advantages of cogeneration.
Tariff: Types of tariff structure: Special tariffs.

UNIT V

Energy Audit of Electrical System: Energy audit (definition as per Energy Conservation Act), Energy audit instruments and their use, Questionnaire for energy audit projects,

Energy flow diagram (Sankey diagram), Simple payback period, Energy Audit procedure (walk through audit and detailed audit), Energy Audit report format.

Course Outcomes: After completing this course the students shall understand the following points:

- Interpret energy conservation policies in India.
- Implement energy conservation techniques in electrical machines.
- Apply energy conservation techniques in electrical installations.
- Use Co-generation and relevant tariff for reducing losses in facilities.
- Undertake energy audit for electrical system.

Text Books:

1. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
2. Sharma, K. V., Venkataseshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298
3. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K Kataria &Sons, New Delhi ISBN-13:9789350141014.
4. Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Efficient Use and Management of Electricity in Industry, Devki Energy Consultancy Pvt. Ltd.

Reference Books:

1. Mehta ,V. K., Principles of Power System, S. Chand &Co.New Delhi, 2016, ISBN 9788121905947
2. Chakrabarti Aman, Energy Engineering And Management, e-books Kindle Edition.
3. Guide Books No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency.
4. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
5. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-0195606539

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

UTILIZATION OF ELECTRICAL ENERGY

DEE-C 603

MM:100
TIME: 3 Hrs
L T P
3 0 0

SESSIONAL:30
ESE: 70
CREDITS: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Able to get a comprehensive idea in utilization of electrical power such as drives, electric heating.
- Learn about electric welding and illumination, electric traction, electrolysis, refrigeration air-conditioning and automobile electric system.

UNIT I

Electric Drives: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT II

Electric Heating: Advantages and methods of electric heating, methods of heat transfer, Stefan's law, resistance heating, design of heating elements, losses and efficiency, construction and working principle of induction furnaces, arc furnaces and dielectric heating and control equipment.

UNIT III

Electric Welding: Type of welding, resistance and arc welding, electric welding equipment, comparison between A.C and D.C Welding.

Unit– IV

Illumination: Introduction, Terms used in illumination, laws of illumination, sources of light. Incandescent lamps, Discharge lamps, MV and SV lamps, fluorescent lamps- effect of voltage variation on lamp efficiency - Type of lighting schemes, factory lighting, flood lighting and street lighting.

Unit– V

Electric Traction: System of electric traction and traction electrification, Diesel electric traction systems in India, Special features of traction motors, overhead electrical equipment – collectors – modern electric locomotive – methods of track electrification.

Course Outcomes: After completing this course the students shall understand the following points:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading condition.
- To acquaint with the different types of heating and welding techniques.
- To understand the basic principle of electric traction including speed–time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management.

Text Books:

1. Art & Science of Utilization of Electrical Energy - by Partab, Dhanpat Rai & Sons
2. Utilization of Electrical Power including Electric drives and Electric traction byJ.B.Gupta, S.K. Kataria & Sons, .
3. Automobile Engineering by Dr Kirpal Singh , Stadard Publishers and Distributors

Reference Books:

1. Generation, Distribution and Utilization of Electrical Energy – by C.L.Wadhwa New Age international (P) Limited,Publishers,1997
2. Utilization of Electrical Power including Electric drives and Electric traction – by N.V. Suryanarayana, New Age International (P) Limited, Publishers, 1996.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ENERGY MANAGEMENT

DEE- P 604

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives: The course objective is to;

- To provide students with a general awareness on the importance of energy and its conservation, its impact on society, various energy sources, energy conversion processes, energy management, energy audit and energy conservation measures.

UNIT I

Energy Management: Overview of energy management, need for energy conversation (Started with oil crisis). Environmental Aspects, Alternative sources of energy. Need for Energy conservation with brief description of oil and coal crisis. Environmental aspects. Alternate sources of energy. Energy efficiency-its significance.

UNIT II

Energy Conservation Basics Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference Indian Electricity Act 2001; relevant clauses of energy conservation BEE and its Roles MEDA and its Roles Star Labelling: Need and its benefits.

UNIT III

Energy Efficient Devices: Need for energy efficient devices, Initial cost versus life cycle cost analysis on life cycle basis, Energy efficient motors as compared to standard motors, BIS specification for energy efficient motors, Salient design features, Efficiency as a function of load, safely margins, Energy efficient lighting system different sources, lumens/watt, LEDs, role of voltage on efficiency, Distribution system.

UNIT IV

Energy Audit: Energy Audit Methodology, Efficiency of energy conversion processes, monitoring system, Specific energy consumption- Three pronged approach, Five tuning, Technical up, Gradation, Avoidable losses, Case studies of energy audit of distribution system, AC motors, Industries, Organisation of energy audit activities.

UNIT V

Energy storage and Distribution: Electrical energy route, Load curves, Energy conversion plants for Base load, Intermediate load, Peak load and Energy displacement, Energy storage plants.

Course Outcomes: After completing this course the students shall understand the following points:

- The students shall have an understanding of the impact of energy on society, the need for sustainable energy, global and Indian energy policies.
- They would have gained knowledge on various techniques of energy management and conservation. They would also have gained the basic ideas of conducting an energy audit

Text Books:

1. Amlan Chakrabarti, Energy Engineering and Management, Prentice Hall India, 2011.
2. Eastop T. D. and D. R. Croft, Energy Efficiency for Engineers & Technologists, Longman, 1990.
3. Albert Thumann P. E. and W. J. Younger, Handbook of Energy Audits, Fairmont Press, 2008.

Reference Books:

1. Doty S. and W. C. Turner, *Energy Management Hand book*, 7/e, Fairmont Press, 2009.
2. Rao S. and B. B. Parulekar, *Energy Technology*, Khanna Publishers, 2005.
3. Rai G. D., *Non-conventional Energy Sources*, Khanna Publishers, 2011.

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ELECTRIC VEHICLES
DEE-P 605

MM:100 | **SESSIONAL:30**
TIME: 3 Hrs | **ESE: 70**
L T P | **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- Design illumination schemes and associated electrification of buildings.
- To understand the importance of illumination engineering in energy conservation.
- To guide students towards acquiring the knowledge regarding the fundamentals and elementary design aspects of artificial lighting.

UNIT I

Introduction to Hybrid Electric Vehicles: Evolution of Electric Vehicles Advanced Electric drive vehicle technology Vehicles-Electric vehicles (EV), Hybrid Electric drive (HEV), Plug in Electric vehicle (PIEV), Components used Hybrid Electric Vehicle Economic and environmental impacts of Electric hybrid vehicle Parameters affecting Environmental and economic analysis Comparative study of vehicles for economic, environmental aspects

UNIT II

Dynamics of hybrid and Electric vehicles: General description of vehicle movement Factors affecting vehicle motion- Vehicle resistance, tyre ground adhesion, rolling resistance, aerodynamic drag, equation of grading resistance, dynamic equation Drive train configuration, classification of vehicle power plant Performance characteristics of IC engine, electric motor, need of gear box Classification of motors used in Electric vehicles.

UNIT III

DC-DC Converters for EV and HEV Applications: EV and HEV configuration based on power converters Classification of converters –unidirectional and bidirectional Principle of step down operation Boost and Buck- Boost Converters Principle of Step-Up Operation Two quadrant converters; multi quadrant converters

UNIT IV

DC-AC Inverter & Motors for EV and HEVs: DC-AC Converters Principle of operation of half bridge DC-AC inverter (R load, R-L load) Single phase Bridge DC-AC inverter with R load, R-L load Electric Machines used in EVs and HEVs.

UNIT V

Batteries: Overview of batteries Battery Parameters, types of batteries Battery Charging, alternative novel energy sources-solar photovoltaic cells, fuel cells, super capacitors, flywheels Control system for EVs and HEVs, overview, Electronic control unit ECU Schematics of hybrid drive train, control architecture Regenerative braking in EVs

Course Outcomes: After completing this course the students shall understand the followingpoints:

- Interpret the salient features of Hybrid electric vehicles.
- Interpret the Dynamics of hybrid and Electric vehicles
- Maintain the DC-DC converters in EV applications.
- Maintain the DC-AC converters in EV applications
- Select the batteries for EV applications.

Text Books:

1. A.K. Babu, Electric & Hybrid Vehicles, Khanna Publishing House, New Delhi (Ed. 2018)
2. Fuhs, A. E. Hybrid Vehicles and the Future of Personal Transportation, CRC Press,
3. Gianfranco, Electric and Hybrid Vehicles: Power Sources, Models, Sustainability, Infrastructure And The Market, Pistoja Consultant, Rome, Italy,
4. Ehsani, M. Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press
5. Husain, I. Electric and Hybrid Electric Vehicles, CRC Press

Reference Books:

1. Lechner G. and H. Naunheimer, Automotive Transmissions: Fundamentals, Selection,Design and Application, Springer.
2. Rashid, M. H. Power Electronics: Circuits, Devices and Applications, 3rd edition, Pearson,
3. Moorthi, V. R. Power Electronics: Devices, Circuits and Industrial Applications, Oxford University Press
4. Krishnan, R. Electric motor drives: modelling, analysis, and control, Prentice Hall
5. Krause, O. P. ; C. Wasynczuk, S. D. Sudhoff, Analysis of electric machinery, IEEE Press

(Effective from the session 2022-23)

Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

ENTERPRENEURSHIP DEVELOPMENT AND MANAGEMENT

DEE- O 605

MM:100 **SESSIONAL:30**
TIME: 3 Hrs **ESE: 70**
L T P **CREDITS: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives: The course objective is to;

- Provide a precise understanding into the nature of entrepreneurship, its dimensions and certain innovative entrepreneurial process.
- Give experiential learning so that it would prepares students to run and manage business/es and eventually start their own business/es, or takeover or run existing business/es with an eye toward expansion and growth.
- Widens the scope of jobs after passing this or they can go for further higher studies.

UNIT I

Entrepreneurship: Introduction, Objective and Concept of Entrepreneurship, Meaning, Definitions, Characteristics and functions of Entrepreneurship, Understanding the terms Entrepreneur, Entrepreneurship and Entrepreneurship Development, Conceptual Development of Entrepreneur: Introduction, Case Study, Innovation in Entrepreneurship Meaning of innovation and Significance.

UNIT II

Theories & Fundamental outlook of Entrepreneurship: Historical perspective, Perspectives on the emergence of Entrepreneurship, Theories of Eminent Thinkers, Women Entrepreneurship, Rural Entrepreneurship, Tourism Entrepreneurship.

UNIT III

Organization, Traits& Financial statements: Different forms of Business Organizations, Practicalities relating to forms of Business Organizations, Parameters determining competitive advantages , Porter's five forces model of competition, Business Model Canvas of winning business (Illustrations), Traits of an Entrepreneur, Entrepreneurial Motivation, Motivation theories of Entrepreneurship.

UNIT IV

Startup & Agencies: Definition& Types of Startup, Economic Contribution of Startups, National and International Scenario, Vision, mission and values, Success & Failure stories of Startups, Reasons of failure of Startups, marketing for start-ups, Business Models in Startup, Business Trends, Agencies for Consultancy, Training and other Support , Driving forces of startups, startup Evaluation

UNIT V

Project & Project Management: Meaning and Concept of Project, Introduction to Project Management, Project Budgeting/Capital Budgeting, Meaning and Definition of Project/Capital Budgeting , Business Plan and Pitching the Business Plan, Types of Capital Expenditure , Factors Affecting Capital Investment Decisions, Founding Team and Early Recruits in Projects.

Course Outcomes: After completing this course the students shall understand the following points:

- To apply the concepts and skills necessary to become a successful Entrepreneur.
- To become a proactive individual who is driven to act on opportunities by employing innovative processes in the face of limited resources.
- To become a person with ability to foster social consensus while upholding mutual understanding and trust.
- To establish teamwork to achieve set goals.
- To demonstrate ability to perform innovative business activities and write bankable business proposals.

Text Books:

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi

Reference Books:

1. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
2. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
3. Handbook of Small Scale Industry by PM Bhandari
4. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.