PROGRAMME GUIDE

DIPLOMA IN ENGINEERING

ELECTRICAL ENGINEERING

(POLY. EE)

- Scheme of Examination (CBCS/ELECTIVE)
- Detailed Syllabus

DR. C.V.RAMAN UNIVERSITY

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Dr. C.V. RAMAN UNIVERSITY

Kargi Road, Kota, Bilaspur (C.G.)

DEPARTMENT OF ELECTRICAL ENGINEERING

INTRODUCTION

The Department of Electrical Engineering is a blend of teaching and research activities pertaining to both electronics and Electrical Engineering. At present the Department offers B.E., Diploma and PhD degrees. The diversity is reflected in the breadth of theoretical and laboratory courses that are on offer and the research activities of the faculty members. The Department firmly believes in imparting a strong hands-on flavour to the courses that a student takes, and therefore places emphasis on the laboratory component, internships and projects.

The Department has a healthy mixture of young and experienced faculty members, all of whom display high levels of enthusiasm and dedication. Apart from teaching and research, the faculties are actively involved in organizing technical workshops, camps and visits at the Institute to create an environment conducive to experiential learning.

The Department with its strong pool of faculty, well-developed laboratories, latest software and hardware facilities, contributes to develop life-long learning skills to its Diploma graduate and PhD students, while producing worthy researchers

VISION:

- To evolve as a centre of excellence, to train and develop student knowledge in contemporary technologies.
- To make the electrical engineers to meet the technological challenges for the well being of this nation.
- To develop them as a skilful engineers with human values and professional ethics.

MISSION:

- To ensure that every student is aware of their responsibilities of an engineer in society through exposure to ethics, equity, public and worker safety with also health consideration, together with the concept of sustainable development.
- To provide knowledge base and consultancy services to the rural & tribal community around us of their uplift and well being.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

The five broad EE Program Educational Goals (Objectives) are

1. Have the laboratory skills and the ability to use modern analysis and design techniques and state-

of-the-art equipment to solve practical engineering problems
2. Have the professional skills to function effectively in the work environment as well as in the community.
3. Have a solid understanding of professional and ethical responsibility
4. Have a broad education in order to understand contemporary issues and the impacts of technology on society and the environment
5. Have the ability to engage in life-long learning and recognize its importance

PROGRAM OUTCOMES:

1. The ability to apply science, engineering science, and mathematics to solve engineering problems.
2. The ability to put their engineering and design skills into practice.
3. The ability to use industrial-quality laboratory equipment and engineering software for analysis, testing, design, and communication.
4. The ability to design systems, components, and processes that satisfy predetermined constraints.
5. The ability to put engineering problems, put them in solvable form, and develops and evaluates alternative solutions.
6. The ability to communicate their ideas and designs clearly orally, in written form, and graphically.
7. The ability to work as members of a team.
8. had the opportunity to develop leadership skills
9. Understand ethical principles and their role in the engineering profession.
10. Have sufficient knowledge of the humanities and social sciences to understand contemporary issues concerning the interaction between technology and society.
11. Understand that the products they develop and the methods used to manufacture them can affect the environment.
12. Realize that the practice of electrical engineering is constantly evolving and that engineers must have the ability to acquire new knowledge and skills on their own.
13. Have the ability to earn graduate degrees or pursue other continuing education opportunities

PROGRAM SPECIFIC OUTCOMES:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Project management and finance**: Demonstrate knowledge and understanding of the engineering

and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

5. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
6. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
7. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
8. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
9. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
10. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER Ist													
CourseDetails				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDDE101	Basic Science	Mathematics-I	100	50	17	20	07	30	15	2	1	0	3
2TDDE102	Engineering Science Course	Applied Mechanics	100	50	17	20	07	30	15	2	1	0	3
2TDDE103	Basic Science	Physics	100	50	17	20	07	30	15	2	1	0	3
2TDDE104	Mandatory Course	Environment Engineering & safety	100	50	17	20	07	30	15	2	1	0	3
2TDDE105	Humanities	Communication Skills-I	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
2TDDE102	Engineering Science Course	Applied Mechanics	50	25	12	-	-	25	12	-	-	1	1
2TDDE103	Basic Science	Physics	50	25	12	-	-	25	12	-	-	1	1
2TDDE105	Humanities	Communication Skills-I	50	25	12	-	-	25	12	-	-	1	1
Grand total			**650**							**10**	**5**	**3**	**18**

Minimum Passing Marks are equivalent to Grade D
Minor- Pre-University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

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w.e.f. july 2020-21

DIPLOMA IN ENGINEERING

Duration: 36 Months (3 Years) Eligibility: 10th Pass

COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER IInd														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits	
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution	
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks					
Theory Group														
2TDDE201	Basic Science	Mathematics-II	100	50	17	20	07	30	15	2	1	0	3	
2TDDE202	Engineering Science Course	Engineering Graphics	100	50	17	20	07	30	15	2	1	0	3	
2TDDE203	Basic Science	Chemistry	100	50	17	20	07	30	15	2	1	0	3	
2TDDE204	Engineering Science Course	Fundamentals Computer & IT	100	50	17	20	07	30	15	2	1	0	3	
2TDDE205	Humanities	Communication Skills-II	100	50	17	20	07	30	15	2	1	0	3	
Practical Group				Term End Practical Exam				Sessional						
2TDDE203	Basic Science	Chemistry	50	25	12	-	-	25	12	-	-	1	1	
2TDDE204	Engineering Science Course	Fundamentals Computer & IT	50	25	12	-	-	25	12	-	-	1	1	
2TDDE205	Humanities	Communication Skills-II	50	25	12	-	-	25	12	-	-	1	1	
Grand total			**650**							**10**	**5**	**3**	**18**	

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COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER IIIrd

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDEE301	Professional Core	Elements Of Electrical Engineering	100	50	17	20	07	30	15	2	1	0	3
2TDEE302	Professional Core	Electrical Circuits	100	50	17	20	07	30	15	2	1	0	3
2TDEE303	Professional Core	Basic Electronics	100	50	17	20	07	30	15	2	1	0	3
2TDEE304	Professional Core	Electrical drawing	100	50	17	20	07	30	15	2	1	0	3
2TDEE305	Professional Core	Renewable energy sources	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
2TDEE301	Professional Core	Elements Of Electrical Engineering	50	25	12	-	-	25	12	-	-	1	1
2TDEE302	Professional Core	Electrical Circuits	50	25	12	-	-	25	12	-	-	1	1
2TDEE303	Professional Core	Basic Electronics	50	25	12	-	-	25	12	-	-	1	1
Grand total			**650**							**10**	**5**	**3**	**18**

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DIPLOMA IN ENGINEERING

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COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER IVth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDEE401	Professional Core	Electrical machines I	100	50	17	20	07	30	15	2	1	0	3
2TDEE402	Professional Core	Electrical Measurement And Measuring Instruments	100	50	17	20	07	30	15	2	1	0	3
2TDEE403	Professional Core	Digital Electronics	100	50	17	20	07	30	15	2	1	0	3
2TDEE404	Professional Core	Generation Transmission And Distribution	100	50	17	20	07	30	15	2	1	0	3
2TDEE405	Management Course	Industrial Management	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
2TDEE401	Professional Core	Electrical machines I	50	25	12	-	-	25	12	-	-	1	1
2TDEE402	Professional Core	Electrical Measurement And Measuring Instruments	50	25	12	-	-	25	12	-	-	1	1
2TDEE403	Professional Core	Digital Electronics	50	25	12	-	-	25	12	-	-	1	1
Grand total			**650**							**10**	**5**	**3**	**18**

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COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER Vth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
2TDEE501	Professional Core	Instrumentation And Control	100	50	17	20	07	30	15	2	1	0	3
2TDEE502	Professional Core	Power Electronics	100	50	17	20	07	30	15	2	1	0	3
2TDEE503	Professional Core	Electrical Machines II	100	50	17	20	07	30	15	2	1	0	3
2TDEE504	Professional Core	Estimation And Costing	100	50	17	20	07	30	15	2	1	0	3
2TDEE505	Professional Core	Power System Operation & Control	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
2TDEE501	Professional Core	Instrumentation And Control	50	25	12	-	-	25	12	-	-	1	1
2TDEE502	Professional Core	Power Electronics	50	25	12	-	-	25	12	-	-	1	1
2TDEE503	Professional Core	Electrical Machines II	50	25	12	-	-	25	12	-	-	1	1
Grand total			**650**							**10**	**5**	**3**	**18**

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Minor- Pre-University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

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COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER VIth														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
*	Professional Core	Professional Elective	100	50	17	20	07	30	15	2	1	0	3
2TDEE602	Professional Core	Utilization Of Electrical Power	100	50	17	20	07	30	15	2	1	0	3
2TDEE603	Professional Core	Electrical Installation Maintenance and Testing	100	50	17	20	07	30	15	2	1	0	3
Practical GroupP				Term End Practical Exam				Sessional					
*	Professional Core	Professional Elective	50	25	12	-	-	25	12	-	-	1	1
2TDEE602	Professional Core	Utilization Of Electrical Power	50	25	12	-	-	25	12	-	-	1	1
2TDEE604	Project Work	Project	200	100	50	-	-	100	50	-	-	4	4
2TDEE605	Professional Core	Professional activity	50	-	-	-	-	50	25	-	-	3	3
Grand total			650							6	3	9	18

***Professional Elective subjects**

List of Elective Subject		
S.No.	Subject Code	Subject Name
1	2TDEE601-A	(A) Switch Gear And Protection
2	2TDEE601-B	(B) Electric Traction

Minimum Passing Marks are equivalent to Grade D L- Lectures T- Tutorials P-Practical
Major- Term End Theory / Practical Exam Minor- Pre-University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

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SEMESTER- 1st
Course: Diploma EE
SUBJECT: MATHEMATICS-I

Subject Code: 2TDDE 101
Theory Max. Marks: 50
Theory Min. Marks:17

COURSE OBJECTIVE:

Mathematics forms backbone for all technologies and hence occupies an important place in the curriculum of polytechnic education. The subject is equally important for the future self-development of Polytechnic students. In designing the curriculum for foundation course, the admission level to Polytechnics has been considered as 10th Board examination and mathematical needs of Technical subject have been given due consideration.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**Permutation:** Meaning of factorial n, Permutation of 'n' dissimilar thing taken 'r' at a time **Combination:** Combination of n dissimilar things taken 'r' at a time Binomial Theorem: Statement of the theorem for positive integer, General Term, Middle term, Constant term	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**Partial Fractions:** Define a proper-improper fraction, Break a fraction into partial fraction whose denominator contains Linear, Repeated linear and Non repeated quadratic factors.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**Determinant:** Concept & principles of determinants ,Properties of determinant , Simple examples. **Complex Numbers:** Algebra of Complex Numbers ,Polar form	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	**Trigonometry :**Allied angles, trigonometrical ratios of sum and difference of angles, (only statement),sum and difference of trigonometric ratios (c-d formula),multiple angles (only double angle and half angle),properties of triangle (without proof)	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – V	**Matrix:** Definition of matrix, types of matrix, row, column, square, unit, upper and lower triangular, symmetric & skew symmetric, singular and nonsingular matrices, Adjoint of a matrix, inverse of a matrix.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

Course Outcome:
Through this syllabus the diploma student will learn the basic concepts ofcounting principle through permutation and ombination, expansion of a binomialfunction , breaking up a complex fraction into simpler partial fractions,trigonometric ratio and concept of matrix

TEXT BOOKS:

- Engineering Mathematics , Iyenger , SRK., Narosa Publshing, New Delhi
- Engineering Mathematics I, Agarwal D.C, Meerut:Shree Sai Prakashan
- Basic Engineering Mathematics, Dass H. K., Delhi S. Chand Group
- Higher Engineering Mathematics, B.S. Grewal, Delhi, Khanna Publishing

REFERENCE BOOKS:

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- Calculus ,Loomis,Addison Wesley
- Applied Mathematics, Abhimanyu singh, Anne books
- Engineering Mathematics, Dr. G Balaji, Balaji Publishers
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Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide mathematical skills	Goal 04(Quality education)	

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SEMESTER- 1st
Course: Diploma EE
SUBJECT: APPLIED MECHANICS

Subject Code: 2TDDE 102
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- Ability to apply knowledge of mathematics, science, and engineering.
- Solve for the resultants of any force systems.
- Determine equivalent force systems.
- Determine the internal forces in plane frames, simple span trusses and beams.
- Solve the mechanics problems associated with friction forces.
- Obtain the centroid, first moment and second moment of an area.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**COMPOSITION AND RESOLUTION OF FORCES** Definition, Effect, characteristics of force, System of Forces, Principle of Transmissibility of Forces, Concept of Resultant Force, Law of Parallelogram of Forces, Triangle of Forces, Polygon of Forces, Determination of Resultant of two or more concurrent forces (analytically and graphically). **PARALLEL FORCES AND COUPLES** Classification of Parallel Forces, Methods of finding resultant Force of parallel forces- analytically graphically, Position of resultant force of parallel forces, Definition, Classification and characteristics of a force Couple, moment of couple.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**MOMENTS AND THEIR APPLICATIONS** Definition, Types and law of moment, Varignon's Principle of moment and its applications, Lever and its Applications, Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL). **EQUILIBRIUM OF FORCES** Equilibrium of a system of concurrent forces, Conditions and types of Equilibrium, Lami's Theorem and its applications.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**CENTRE OF GRAVITY** Difference between Centroid and Center of Gravity (CG), Centroid of standard plane figures and CG of simple solid bodies, Method of finding out Centroid of composite plane laminas and cut sections, Method of finding out CG of Composite solid bodies. **FRICTION** Concept and types of friction, Limiting Friction, coefficient of friction, angle of friction, angle of repose, Laws of friction (Static and Kinetic), Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane, Utility / Nuisance value of friction.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	**SIMPLE LIFTING MECHINES** Concept of lifting Machines, Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation, Reversibility of Machines and condition for self locking machine, Law of Machines, Maximum mechanical advantage and maximum efficiency of machine, Friction in machine (In terms of Load and effort), Calculation of M. A, V.R. and efficiency of following machines • Simple wheel and axle	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

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	• Differential wheel and axle • Single purchase crab • Double purchase crab • Simple screw jack • Different System of simple pulley blocks **MOTION OF A PARTICLE** Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration, Motion under constant acceleration/ retardation (equations of motion), Motion under force of gravity, Concept of relative velocity, Definition of projectile, velocity of projection , angle of projection, time of light, maximum height, horizontal range and their determination, Definition of angular velocity, angular acceleration and angular displacement, Relation between linear and angular velocity of a particle moving in a circular path, Motion of rotation under constant angular acceleration.	
Unit – V	**LAWS OF MOTION** Newton's Laws of motion and their applications. **WORK, POWER AND ENERGY** Definition unit and graphical representation of work, Definition and unit of power and types of engine power and efficiency of an engine, Definition and concept of Impulse, Definition, unit and types of energies, Total energy of a body falling under gravity.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

List of Experiments:

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid of plane lemina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
8. Determination of mechanical advantage, velocity ration and efficiency of the following lifting machines
   - Simple wheel and axle
   - Differential wheel axle
   - Single purchase crab
   - Double purchase crab
   - Simple pulley block
   - Simple screw jack
9. Measurement of B.H.P. of an engine using roap break dynamometer

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Course outcome:

At the end of the course, the student will be able to:
• Determine the resultant force and moment for a given system of forces
• Analyze planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction
• Calculate the motion characteristics of a body subjected to a given force system.
• Determine the deformation of a shaft and understand the relationship between different material constants.

TEXT BOOKS:

- Applied Mechanics, R.S. Khurmi, S.C. Chand & Co. , New Delhi
- Applied Mechanics, I.B. Prasad Khanna Publishers, New Delhi
- Applied Mechanics, R.S. Jog, Anand Publishers, Gwalior
- Applied Mechanics, A.R. Page, Deepak Prakashan, Gwalior

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REFERENCE BOOKS:

- Applied mechanics, R K Rajput S Chand publication
- Engineering Mechanics, R K Bansal, Pearson
- Applied mechanics, Henry Taylor Bovey, Nabu

job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design engineer	Able to provide forces, directions skills	Goal 04(Quality education)	Simple wheel and axle • Differential wheel and axle • Single purchase crab • Double purchase crab • Simple screw jack • Different System of simple pulley blocks Work,power and Energy Newtons Laws of motion and their applications.

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SEMESTER- 1st
Course: Diploma EE
SUBJECT: PHYSICS

Subject Code: 2TDDE 103
Theory Max. Marks: 50
Theory Min. Marks:17

COURSE OBJECTIVE:

The development of various diploma engineering topics is primarily based on the fundamental principles. The different principles of physics have a wide range of applications in all the branches of engineering. A reasonably good level of knowledge of physics, therefore, forms sound base for engineering students. Physics can be considered as a basic tool in the hands of an engineer through which he can pure his studies and research work in technical field. The foundation level of the subject acquired by the student is kept in mind for selection of the topics. To create interest in the students more stress is given on the applications, in engineering field

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**UNITS & Measurement, Motion** Fundamental and derived units, Scalar and vector, Basic requirements to represent vector Symbols, abbreviation, and proculation Linear measurement by vernier calipers, screw gauge and spherometer Angular measurement by angular vernier Motion and its type Linear motion ,Circular motion ,Angular velocity and relation with linear velocity ,Centripetal acceleration, Centripetal and Centrifugal forces Rotatory motion Axis of rotation Moment of Inertia, Radius of gyration Kinetic energy of rotation Numerical problems and solution on the topic	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**Molecular Phenomenon Solids, Liquids And Properties Of Matter** Postulates Of Molecular Kinetic Brownian motion Kinetic and Potential energy of Kinetic theory of gases Postulates Calculation of pressure by Kinetic theory Prove of different gases law by Kinetic theory, Elasticity: Meaning, definition, stress, stain, Hook's law and elastic limit Surface Tension: Meaning, definition, molecular forces, cohesive and adhesive forces, Surface energy, capillary rise and capillary rise method. Viscosity : Meaning, definition, stream line and turbulent flow, critical velocity, Stock's law. Numerical problems and solution on the topic.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**Heat Heating Effect Of Current And Thermoelectricity** Heat and temperature, concept of heat as molecular motion Transmission of heat, study state and variable state. Concept of heat capacity, specific heat and latent heat. Calorimeter and its uses Thermodynamics Relation between heat and work Mechanical equivalent of heat First law of thermodynamics and its application, Second law of thermodynamics and its application ,Carnot cycle Numerical problems and solution on the topic., Heating effect of electric current: Joule's law, work energy and power in electric circuit, calculation of electric energy. Thermo electricity See back effect and thermoelectric power, Neutral temperature, temperature of inversion and relation between them Thermo electric thermometer and thermo couples. Numerical problems and solution	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	**Sound Optics And Optical Instruments** Reduction of sound waves(Longitudinal and transverse waves)Progressive and stationary waves Basic knowledge of refraction , reflection, interference and diffraction. Ultrasonic, Audible range, Production of ultrasonic, properties due Refraction, critical angle and total internal reflection, refraction through lenses and problems Power of lenses Spherical and chromatic aberrations Simple and compound microscope, telescope and derivation for their magnifying power Numerical problems and solution on the	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

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	topic.	
Unit – V	**Electrostatics and Electromagnetic Induction Modern Physics, Basic Electronics** Coulomb's law, Electric field intensity, potential. Capacity, principle of capacitor, types of capacitor, combination of capacitors Electromagnetic Induction: Faraday's law, Lenz's law Self and mutual inductance Transformer and electric motor, Induction coil Photoelectric effect, threshold frequency, Einstein- equation, Photo electric cells Radioactivity : decay constant, Half life, mean life Properties of nucleus, nuclear mass, mass defect Production of x-rays, properties and its uses Thermal emission, semiconductors, Types of semiconductors Explanation of conductor, semiconductor and insulators on the basis of band theory P-N junction, diode as rectifier	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

List of Experiments:

- Refractive index of prism (I-D) curve
- Refractive index of prism (spectrometer)
- Focal length of a convex lens by u-v method
- Focal length of a convex lens by displacement method
- Verification of Ohm's law
- To find out unknown resistance by meter brid
- To find out internal radius of hollow tube by vernier calipers.
- To find out volume of given cylinder by screw gauge.
- Surface tension by Capillary rise method. Coefficient of viscosity
- Coefficient of Thermal conductivity by searl's method.
- Verification of Newton's cooling law.

Course outcome:

- The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies *Select proper measuring instrument on the basis of range, least count & precision required for measurement.
- Analyze properties of material & their use for the selection of material mostly applicable for engineering users.
- Identify good & bad conductors of heat and proper temperature scale for temperature measurement Identify.
- Analyze, discriminate and interpret logical sequence of field problems with the study of physics.
- Analyze variation of sound intensity with respect to distance and follow the principles used in the physical properties, its measurement and selections.

TEXT BOOKS:

- Applied Physics Vol. 1 & 2, Saxena and Prabhakar, S Chand
- Physics, Halliday And Resnic R Wiley
- Engineering Physics, Gaur And Gupta, Dhanpat rai

REFERENCE BOOKS:

- Engineering Physics, B K Pandey, Cengage
- Applied PhysicsP K Diwan, Wiley

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Scientist and Academician ,working professionals	Able to provide vectors ,forces , direction skills	Goal 04(Quality education)	Joule's law, work energy and power in electric circuit

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SEMESTER- 1st
Course: Diploma EE
SUBJECT: ENVIRONMENTAL ENGINEERING & SAFETY

Subject Code: 2TDDE 104
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- To improve the quality of life of the local community through management and conservation of natural resources.
- To ensure that the natural environment is used wisely

as well as judiciously. The natural resources are continuously available for the benefit and enjoyment of future generations.

- To decrease vulnerability and improve adaptation capacity among poor local communities associated with Climate Change.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**Introduction to Environment** The Biosphere, biotic and abiotic, An aquatic ecosystem, Types of pollution Impact of hum a being on environment, Impact of environment on human being, Basic approach to improve environmental qualities, Roll of an environmental engineer	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**Air Pollution Sources and Effects** Standard definition of air pollution, Composition of natural air, Names of air pollutants, Classification of air pollutants, primary and secondary pollutants, Classification of source of air pollutants on different bases, Definition of different types of aerosols, Effect of air pollution on: human health, material properties, vegetation, Major toxic metals and their effects, Major environmental phenomenon e.g., acid rain, global warming, green house effect, ozone layer depletion, Air quality standards, Brief description of air pollution laws.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**Meteorological Aspects of Air Pollutant Dispersion** Meteorological parameters influencing air pollution, Environmental laps rate, temperature inversion, atmospheric stability and adiabatic loss rate, Turbulence, topographical effects, Plume behavior, looping, coning, fanning fumigation, lofting , trapping. **Air Pollution Control Methods and Equipments** Natural purification processes of air, Artificial purification methods of air, Brief description of following control equipments along with sketch e.g, gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator, Brief description of following processes for the control of gaseous pollutants e. g., absorption, adsorption, condensation, combustion etc.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	**Water Pollution Sources and Classification** Water resources, Uses of water, Classification of water, Origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, Water pollution laws and standards, Uses of waste water, Classification of waste water, Chemical oxygen demand **Waste water treatment method** basic processes of water treatment, Meaning of primary, secondary and tertiary treatment, Flow chart of a simple effluent treatment plant, Theory of industrial waste treatment, Volume reduction, neutralization and proportion	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – V	**Solid Waste Management** Sources and classification of solid waste, Public health aspects, Disposal methods - open dumping, sanitary, land fill, Incineration,	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the

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	compositing, Potential methods of disposal, Recovery and recycling of paper, glass, metal and plastic **Noise Pollution and Control** Sources of noise pollution, Units of Noise pollution measurement, Allowable limits for different areas, Problems of noise pollution and measures to control it, Noise pollution control devices brief discussion **Safety Practices** Responsibility of employees and employers regarding health and safety, Fire hazards prevention and precautions, Industrial hazards prevention and protection, Protection from air and noise pollution	topic

List of Practicals:

1. Group A Air Pollution
(any one experiment may be selected from this group)

1. Air monitoring and determination of SPM, CO, Nox, S02 with high volume sampler.

2. Monitoring of stack gases and determination of SPM, CO, Nox, S02 with slack monitoring kit.

3. Determination of CO,HC, in exhaust gases from petrol vehicle

2. Group B Noise Pollution

1. Determination of sound pollution in (a) Auditorium (b) Factories (c) Busy roads (d) Theatre (e) TV rooms (select any three situations)

3. Group C Industrial Waste Water (Any Two Experiment May Be Selected From This Group)

1. Determination of BOD/COD ratio in industrial waste water.

2. Determination of Ph and alkanity/ acidity in industrial waste water.

3. Determination of solids in industrial waste water.

4. Determination of turbidity, colour, and temperature of industrial waste water.

4. Group D Pollution Standards (Any Two Experiment May Be Selected From This Group)

1. Study of drinking water standards.

2. Study of effluent standards for water disposal.

3. Study of air pollution standards.

Course Outcome:

- After successful completion of this course students will able to
- Enhance the use of recycled material for construction work and optimize theuse of conventional energy sources.
- Take care of issues related to Conservation & Hazard Management whileworking as chemical engineer.
- Assess the effects of pollution on resources.
- Justify need of renewable energy for sustainable development.
- Identify concept of waste management and methods of recycling.
- Prepare list of use of do's and don'ts applicable during disasters.

TEXT BOOKS:

- Environmental pollution control Engineering, C. S. Rao, PHI
- Air pollution and control, Seth, S Chand
- Air pollution, M.NRao, TMH

REFERENCE BOOKS:

- A Textbook of environmental studies, Dr D K Asthana, S Chand

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- Fundamentals of air pollution engineering, Richard C. Flagan John H. Seinfeld Prentice Hall

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Safety officers Forest guard Forest ranger	Able to provide to clean and green ecosystem and environmental protection skills	Goal 04(Quality education)	

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SEMESTER- 1st
Course: Diploma EE
SUBJECT: COMMUNICATION SKILL-I

Subject Code: 2TDDE 105
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

The main aim of communicating is to pass information so that other people may know about what you are talking off. This can be through facts or even feelings.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**Sentences** –simple compound ,complex Articles –usage of 'A' , 'AN', 'THE' Preposition—position of prepositions ,place Relations Time Relations **Tenses** – past perfect ,present perfect progressive ,past perfect Progressive, simple present and present progressive	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	Modals , Antonyms ,synonyms ,one word substitution ,jumbled sentences, Idioms and phrases ,correction of sentences with words likely to be confused word formation like prefix and suffix	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	Comprehension of unseen passage short answer type questions to test understanding of the passage	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	Précis –writing -Introductory Remarks, Method of procedure, Summing up	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – V	Essay-writing -- Introductory Remarks, Characteristics of a good Essay, Classifications of Essays, Method of collecting materials	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

Course Outcome:

Through this syllabus the diploma students will learn the basic concept of English.Student should gain the ability to read understand, analyze, intercept andextrapolate from the complex texts that are at the heart of the diver's traditions ofthe English language.

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TEXT BOOKS:

- English Conversation Practice, Grant Taylor, TMH

- Communication Skills, Somaiya, M/S Somaiya Publication, Bombay
- English Grammar, Usage, and Composition, Tickoo & Subramanian, S. Chand

REFERENCE BOOKS:

- Communication for Engineers, P. Prasad Kataria and sons publications, New Delhi
- Effective Business Communication, M.V. Rodriques, Concept Pub. Co., New Delhi
- Essentials of Business Communication, Dr. Rajendra Pal & J.S. Korlahalli, S.Chand & Sons, New Delhi.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide speak English	Goal 04(Quality education)	

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SEMESTER- 2nd
Course: Diploma EE
SUBJECT: MATHEMATICS-II

Subject Code: 2TDDE 201
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

The main of teaching mathematics is to provide students with an adequate knowledge on the subject to serve as a tool in the learning of various engineering subjects and to solve technical problems encountered during the course of study . It can also serve as a foundation for their future work involving computation.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**CO-ORDINATE GEOMETRY** Co-ordinate System: Cartesian and Polar, Distance, Division, .Area of a triangle, Locus of a point and its equation, Slope of St. Line: Angle between two Straight lines, Parallel and perpendicular Straight lines. Standard and general equation of Straight line. Point of intersection of two straight lines .	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**STATISTICS** Measures of Central tendency (Mean, Mode, Median),Measures of Dispersion (Mean deviation, standard deviation)	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**DIFFERENTIAL CALCULUS** Define constant, variable, function, Value of the function, Concept of limit of a function, Definition and concept of differential coefficient as a limit, Standard results, Derivatives of sum, difference, product, quotient of two functions, Differential co-efficient of function of a function, Differential co-efficient of implicit function, Logarithmic Differentiation, Differential coefficient of Parametric function.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	**INTEGRAL CALCULUS** Definition as a inverse process of differentiation, Standard Results (including inverse function), Methods of Integration: Substitution, Integration by parts, Breaking up into partial fraction, Concept of Definite Integral	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit - V	**VECTOR ALGEBRA** Concept of Vector and Scalar Quantities, Different types of vectors. Addition and subtraction of vectors, Components of a vector Multiplication of two vectors: Scalar Product, Vector Product, Applications (Work done, power & reactive power)	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

Course Outcome:

Here in this syllabus student will learn some concept of co-ordinate geometry , some part of statistics viz. mean , median , mode , deviation etc. , and ofcourse a brand new concept of differential calculus and integral calculus which play an important role in technical subjects then concept of vector number , how they are added subtracted and multiplied etc.

TEXT BOOKS:

- Higher Engineering Mathematics, B.S. Grewal, Khanna publisher
- Mathematical Statistics, Kapil Sharma, Ram Prasad publication

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- Differential Calculus, Gorakh Prasad, Pothishala publication

REFERENCE BOOKS:

- Mathematics for Polytechnics, Navjyoti dutta, T.T.T.I. Bhopal
- Engineering Mathematics, Dr. S.K. Chouksey, Khanna publisher
- Integral Calculus, Gorakh Prasad, TMH

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Mathematician	Able to provide knowledge of numerical ability and apptitude skills	Goal 04(Quality education)	

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SEMESTER- 2nd
Course: Diploma EE
SUBJECT: ENGINEERING GRAPHICS

Subject Code: 2TDDE 202
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- To familiarize with the construction of geometrical figures.
- To familiarize with the projection of 1D, 2D and 3D elements .
- To familiarize with the sectioning of solids and development of surfaces.
- To familiarize with the Preparation and interpretation of building drawing .

COURSE CONTENT:

NOTE: Only First Angle Projection Method Is To Be Followed

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Drawing Instruments: Introduction of drawing instruments, materials and their uses, Applications of mini-drafter, Applications of compass and divider, Applications of French curves and spline, Pencils grades and their uses Designation and sizes of drawing sheet and drawing board, Planning and Layout of Drawing Sheet: Planning of drawing sheet as per I. S.: 696-1972 (SP 46: 1988) This should include: Margin, Title Block, Zoning, Revision panel, Folding marks, Numbering of sheet.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**CONVENTIONAL REPRESENTATION:** Conventional representation of the following as per BIS practice **COMMON ENGINEERING MATERIALS ELECTRICAL INSTALLATIONS AND FITTINGS** Main switches, (lighting and power), socket outlets (3 pin 5AMP, 3pini5 AMP), bell, buzzer, loud speaker, Aerial, ceiling fan, exhaust fan, Bracket fan, fan regulator, battery and earth point. **ELECTRONICS COMPONENTS** Diode: Zener, varactor, Scotty, step recovery, light emitting diode (LED), PNP and NPN transistors, resistance, capacitor, Inductors (fixed and variable both), IC (8pin and 14pin) SCR, TRIAC, DIAC, UJT, FET, MOSFET, LOGIC GATES **SANITARY FITTINGS** showerhead, wall lavatory basin, comer Lavatory basin, urinal stall, kitchen sink, Indian type WC,Water closets (Asian pan, urissapan, Anglo-Indian, European) **BUILDING** Single and double swing doors and windows. **MECHANICAL COMPONENTS** Internal and external threads, slotted head, Square end and flat, radial arms and ribs, serrated shaft, splined shaft, Chain wheel, bearing, straight and diamond knurling, Compression and tension spring, leaf spring (with and without eye), Spur and helical gear	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**LINES, LETTERING AND DIMENSIONING:** Introduction of type of lines and their applications, Single stroke vertical, inclined letters (capital and lowercase) And numerals, Dimensioning: Elements of dimensioning- dimension line, extension line, arrowhead and leader line, Dimensioning system - Aligned and unidirectional, Dimensioning of Arcs and Circles, Angular Dimensioning, Dimension of counter sunk and counter bore. **METRICAL CONSTRUCTIONS AND ENGINEERING CURVES:** Divide a line into any number of equal parts by parallel line method bisecting of line and angle. Construction of triangles and polygons Introduction of conic sections (curves),	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

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	Construction of Ellipse by Eccentricity and Concentric circles methods, Construction of Parabola by Eccentricity and Rectangle methods Construction of Hyperbola by Eccentricity method Construction of Cycloid, Construction of Involutes of circle and polygon, Construction of Archimedean Spiral of any number of convolutions	
Unit – IV	**SCALES:** Introduction of scales and their applications, Concept of reducing, enlarging and full size scale, Classification of scales - plain, diagonal, Vernier, Scale of chord and comparative scales, Definition of R.F, Construction of plain and diagonal scales **ORY OF PROJECTION AND PROJECTION OF POINTS, LINES AND PLANES** Definition of various term associated with theory of projection- Planes of projection, Quadrants, first & third angle projection method, Projection of points in all the four quadrants. Projection of lines- Parallel to HP and VP both. 1.Perpendicular to one plane and parallel to other. 2.Inclined to one plane and parallel to other. 3.Knowledge of projection of line inclined to both the planes Projection of planes - 1.Perpendicular to HP and VP both 2.Perpendicular to one plane and parallel to other 3.Inclined to one plane and perpendicular to other. 4.Knowledge of projection of plane inclined to both the planes **PROJECTIONS OF SOLIDS:** Projection of cylinder, cone, prism and pyramid. Under the following conditions: 1. Axis parallel to HP and VP 2. Axis perpendicular to HP and parallel to VP 3. Axis perpendicular to VP and parallel to HP 4. Axis inclined to HP and parallel to VP. 5. Axis inclined to VP and parallel to HP. 6. Axis inclined to both HP and VP	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit - V	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES:** Section of cone, cylinder, prism and pyramid (Solid resting on its base in the HP i.e. the Axis perpendicular to HP and parallel to VP) in the following cases: 1. Section plane parallel to HP and perpendicular to VP 2. Section plane parallel to VP and perpendicular to HP. 3. Section plane inclined to HP and perpendicular to VP. 4. Section plane inclined to VP and perpendicular to HP. Drawing True shape of section. Introduction to development of lateral surface of solids- Cone, Cylinder, Prism and Pyramids (Simple and truncated), Under the condition - solid resting on its base in the HP and axis, Perpendicular to HP and parallel to VP Development of funnel and elbow **1.INTERSECTION OF SURFACES** Intersection of following cases – Cylinder to cylinder and Prism to prism(With their axis intersecting and perpendicular to each other.) **2.ORTHOGRAPHIC PROJECTIONS & FREE HAND SKETCHING:** Principles of orthographic projections, Identification of necessary	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

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	views and superfluous view, Selection of front view, Preparation of necessary orthographic views of simple objects From given pictorial views •Dimensioning of orthographic views as per standard practice. •Free hand sketches of simple objects (Using Pencil, Eraser & Paper only) 3.ISOMETRIC VIEWS •Concept of isometric projection and isometric view (Isometric Drawing) •Construction of isometric scale •Construction of isometric view of polygon and circle •Construction of isometric view of cone, cylinder, prism and pyramids •Construction of isometric view of simple objects From given orthographic views	

Course outcome:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to creating working drawings
- Ability to draw projections and analysing multiple views of object.

TEXT BOOKS:

- Engineering Drawing, N.D. Bhatt, Pearson
- Engineering Drawing, R.K. Dhawan, S.Chand
- Engineering Drawing, P. S.Gill, S.Chand

REFERENCE BOOKS:

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design Engineer draftsman Planning Engineer	Able to provide technical drawing skills	Goal 04(Quality education)	Knowledge of projection of line inclined to both the planes

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SEMESTER- 2nd
Course: Diploma EE
SUBJECT: CHEMISTRY

Subject Code: 2TDDE 203
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

• The objective of the Chemistry in polytechnique courses is to acquaint the students with the basic phenomenon/ concepts of chemistry, the student face during course of their studying the industry. The student with the knowledge of the basic chemistry will understand and explain scientifically the various chemistry related problems in the industry/engineering field. The student will able to understand the new developments and break through sufficient lying engineering and technology.
• To appreciate the need and importance of chemistry for industrial and domestic use.
• To gain the knowledge on existing and future upcoming materials used in device fabrication.
• To impart basic knowledge related to material selection and the techniques for material analysis.
• To impart knowledge of green chemical technology and its applications.
• Demonstrate knowledge of science behind common impurities in water and methods to treat them.
• Knowledge of methods to determine the calorific value of fuels.
• Apply the science for understanding corrosion and its prevention.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**ATOMIC STRUCTURE AND RADIO ACTIVITY** Discovery of electron, proton ,neutron and nucleus. Ruther ford's and Bohr's model of an atom. Bohr Burry scheme of filling the electrons in various orbits. Idea of s,p,d,f orbital .Alfa, Gamma and Beta rays, theory of radio activity, Group displacement law, half life period, numerical problems on half life period, fission and fusion. **SURFACE CHEMISTRY AND ITS APPLICATION** True solution, colloidal solution and suspension, lyophobic and lyophillic colloids, optical and electrical properties of colloids, coagulation, coagulants, idea about gels and emulsions. **ELECTROCHEMISTRY** Electrolysis, Faraday's laws of electrolysis, Numerical problems on Faradays Law, electroplating of copper and nickel.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**COLLIGATIVE PRPOPERTIES** Osmosis & osmatic pressure, Relative vapour pressure and Routls law. Internal energy (enthalpy) Entrophy, Entrophy fusion free energy, Effect of change in temperature catalysis. **CHEMICAL BONDING AND CATALYSIS** (A) Bonding: Nature of bonds- Electro valent, Co-valent, co-ordinate and hydrogen bond. (B) Catalysis: Types, theory characteristic, positive, negative, auto and induced catalyst. Catalytic Promoter, and catalytic inhibitors. Industrial Application of catalysis. **WATER:** Sources of water, types of water, hardness of water, its causes, types and removal, Boiler feed water, harmful - effects of hard water in boiler. Municipal water supply. Numerical on soda lime process. Determination of hardness of water by O. Hener's, EDTA and soap solution method.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**METALS AND ALLOYS:** Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel. General principal of metallurgy, minerals/ ores, ore dressing, roasting ,smelting, bassemerisation, fluxes, purification. Explanation of alloying purposes, methods of alloying, composition and uses of alloy like brass, bronze, duralium, German silver, gun metal, solder, stainless steel, casting and bearing alloy. **IONIZATION, PH VALUE CORROSION AND PROTECTION:**	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

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	Arhenius theory of ionization, factors affecting ionization. pH meaning (numerical), Buffer solutions and Buffer actions, choice of indication (acidimetry and alkalimetry). Explanation of corrosion, types of corrosion, factors effecting corrosion, corrosion control (protection against corrosion), metal and organic coating for corrosion control. **GLASS, CEMENT AND REFRACTORY:** Glass: Basic raw materials for glass, composition and manufacture of glass, varieties of glass and annealing of glass,. Cement : Constituting compounds in cement, Composition of Portland Cement, its manufacture, setting and hardening of cement. Refractories : Meaning, characteristics , use of common refractory materials.	
Unit – IV	**HIGH POLYMERS, RUBBER AND INSULATORS:** Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation Properties and uses of PVC, polyethene, polystyrene, polyamides, polyesters , Bakelite. Synthetic fibers - nylon, rayon, decron, and polyesters. Definition characteristics , classification and properties of insulators. Glass, wool and thermo cole. Idea about rubber and vulcanization. **LUBRICANTS, PAINTS AND VARNISHES:** Lubricants: Meaning , type and theory of lubricants, properties of a good lubricants, Flash and fire point and cloud point, emulsification number, viscosity. Paints and Varnishes : Meaning, ingredients and characteristics of good paints and varnishes, their engineering applications.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – V	**FUELS, FIRE EXTINGUISHERS AND EXPLOSIVES:** Classification of fuel, gross and net calorific value, Determination of a solid fuel by bomb calorimeter, octane and octane number. Proximate analysis of fuel, its utility, crude petroleum, products of fractional distillation . Fire extinguishers - Description and use. Explosives - Meaning, types, characteristic and use of explosives. Name Dynamite, lead azide, T.N.T., Picric acid, R.D.X. **POLLUTION AND CONTROL:** Introduction and chemical toxicology, air and water pollution, control of air and water pollution. Harmful effect of different gases like carbon mono-oxide, carbon dioxide, sulphur dioxide, nitric oxide, nitrous and lead.	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

List of Experiments:

- To identify one Anion and Cation in a given sample.
- Determination of flesh point and fire point of a given sample of oil by Abel's apparatus.
- Determination of viscosity by Red Wood Viscometer no. 1 and no. 2.
- RedoximetryTitration :
    a. Percentage of Iron in given sample of alloy.
    b. Determination of strength of ferrous ammonium sulphate.
    c. Determination of strength of anhydrous ferrous sulphate and ferrous sulphate.
- Determination of hardness of water by :
    a. EDTA Method and Soap Solution Method
- Determination of solid content in the given sample of water.
- Determination of percentage of moisture in the given sample of coal by proximate analysis.

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Course Outcome:

After the completion of the course, the learner will be able to:
- Analyze the need, design and perform a set of experiments.
- Differentiate hard and soft water, solve the related numerical problems on waterpurification and its significance in industry and daily life.

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• Apply the principles of green chemistry in designing alternative reaction methodologiesto minimize hazards and environmental degradation.
• Understand the causes of corrosion, its consequences and methods to minimizecorrosion to improve industrial designs.
• Explain the properties, separation techniques of natural gas and crude oil along withpotential applications and role of petrochemicals in national economy.
• Equipped with basic knowledge of polymers and its application.

TEXT BOOKS:

- Physical Chemistry, Bahl and Tuli, TMH
- Inorganic Chemistry, Satyaprakash, S Chand
- Engineering Chemistry, Rao , Pearson

REFERENCE BOOKS:

- Applied Chemistry, H.N. Sahni, Deepak Prakash
- Polymer Chemistry, O.P. Mishra, Khanna publisher
- Applied Chemistry, Shrivastava & Singhal, Pbs Publication, Bhopal.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide lubricant ,fuels and their treatment skills	Goal 04(Quality education)	

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SEMESTER- 2nd
Course: Diploma EE
SUBJECT: FUNDAMENTALS COMPUTER & IT

Subject Code: 2TDDE 204
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- Learn basic principles of using Windows operation system.
- Learn and practice basic keyboarding and mouse use.
- Be able to access the Internet, Worldwide Web, as well as use Internet directories and search engines, and locate www addresses.
- Be able to find and evaluate information on the Web (learn how to be critical and evaluate what is valid and reliable).
- Learn basic computer and keyboarding related vocabulary in English.
- Learn the basics of e-mail, such as sending, forwarding and receiving mail, attaching documents, creating mailboxes, filters, and address books.
- Learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing, as well as how to include some graphics such as pictures and charts.
- In general, develop an intuitive sense of how computers work and how they can be used to make your academic work more efficient.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**Computer Organization, Evolution And Generation Of Computer Systems:** Block Diagram of computer system: Central Processing Unit, Memory unit ,ALU, Control unit Input & Output devices. Input Device Categorizing input hardware :Key Board, Card readers, Scanning Devices ,Bar Code Readers, OCR, OMR, MICR, Pointing Device, Mouse and its types ,light pen Touch Devices, Web camera ,microphone Joystick, Digitizing tablet. Output Device printers, Dot matrix, Printers, Plotters, and Monitors: CRT, TFT, Plasma, LCD Projector, DLP Projector, Speaker. Computer System Characteristics and capabilities Memory Capabilities, Repeatability Types of Computers & its Application Analog, Digital & Hybrid, General & Special Purpose Computer, Application of computer system Computer Generations & Classification of Computer Systems Minis, Mainframes & Super Computer Evolution of micro Comparative study w.r.t. speed, data bus, controllers, memory, peripheral interface of PC to Pentium computer systems. Decimal, Binary, Octal, Hexadecimal number	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**Number System, Codes & Data Representation, Storage Devices** Systems Inter-Conversion from decimal to binary, octal, hexadecimal, conversion of binary number System to decimal, hexadecimal. Codes used for information exchange between computers–ASCII, Unicode, Data representation- Bit, Nibble, Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte etc Storage Fundamentals, Primary & Secondary Storage. RAM, dynamic and static ROM, PROM, EPROM, EEPROM, ape storage Devices, Characteristics & limitations, Floppy &theirtypes. Direct access Storage– Hard Disk, Disk Cartridges, Mass Storage Device Optical Disk , CD Rom, DVD, flash drive, ZIP drive	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**Computer Software's & Language** System Software V/s Application Software. Types of System Software, Operating System, Loader, Linker, Language Processor, Assembler, Compiler and Interpreter, Device Driver.	Usage of ICT (PowerPoint, Pdf and video lectures) and

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	CLASSIFICATION AND CHARACTERISTICS OF LANGUAGES Machine language, Assembly language, High-level language, Generations of Computer Language Application Software: working with MSOFFICE components, creating editing, formatting and printing documents using MSWORD, Data analysis and charting with MSEXCEL, Creating and presenting slide show using MS POWERPOINT	blackboard (traditional) as per the requirement of the topic
Unit – IV	**Concept of Operating System, System security** Introduction, Functions of operating system, Types –batch, single user, multiuser, multiprogramming, multitasking, multi threading, real-time , embedded, Network, Distributed CLI(Command Line Interface) and GUI modes of O.S. Booting Process, BIOS, POST, Boot Strap Loader Introduction to viruses, worms, Trojans, Anti Viruses scanning & Removal of Viruses ,safety measures- Firewall, updates, Patches	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – V	**Internet Applications:** Introduction to internet, different services of internet- www, E-Mail, Chat (Textual/Voice), website access and information search, Browsers And Search Engines	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

List of Experiments:

1 .Study the uses of input and output device
2. Study the uses of storage devices
3. Backup of data on tape, floppy & hard disk, CD, DVD and in PEN drive
4. Use of windows media player, recording, editing playing sound and video files
5. PRACTICE ON WINDOWS 2000/ XP/Vista
Starting Windows, Exploring the desktop, Arranging windows, my Creating Shortcuts, Practice on moving and Practice on Windows Explorer File organization: creating, copying, moving, renaming and deleting and Practice on Windows Accessories Creating editing, formatting, previewing and printing documents using Shutting down windows.
6. PRACTICE ON MS
Creating editing, formatting, saving, previewing and printing documents.Auto Text, AutoComplete, AutoCorrect, grammar and spellchecker, FindInsert, modify table.Mail merge, Macro, HyperlinkHeader, footer, Watermark.
7. PRACTICE ON MICROSOFT EXCEL
Creating editing, formatting, saving, previewing and printing worksheet.
Use of formula and functions.
Split windows and freeze pans.
Create, edit, modify, print worksheet/charts.
Import & Export D
Pivot table- create, modify
Sorting & Filter data
Header, footer, Watermark.
8. PRACTICE ON POWERPOINT
Create, edit, insert, move, slides.
Open and save presentation.
Insert Object, picture, Diagram, chart, Table, Movie & Sound,
Slide design, layout, background.
slide show, setup, action button, animation scheme, custom animation,

Course Outcomes:

- Demonstrate a basic understanding of computer hardware and software.
- Demonstrate problem-solving skills.
- Apply logical skills to programming in a variety of languages.
- Utilize web technologies.
- Demonstrate basic understanding of network principles.
- Working effectively in teams.
- Apply the skills that are the focus of this program to business scenarios.

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TEXT BOOKS:

- A First Course in Computers S . Jaiswal Golgotha Publication
- Computers Today Suresh K. Basandra Galgotia Publication
- Understanding windows Chapman BPB Publication

REFERENCE BOOKS:

- The Complete Guide to Microsoft Office Professional, Ron Mansfield,Sybex /BPB Asian Edition
- Inside IBM PC., Norton Peter, TMH
- Multimedia Making it work, Tay Vaughan,Tata McGrawHill

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Software and hardware engineer	Able to provide software skills and computer proficiency	Goal 04(Quality education)	

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SEMESTER- 2nd
Course: Diploma EE
SUBJECT: COMMUNICATION SKILLS-II

Subject Code: 2TDDE 205
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

The students, after completing the course,will be able to use general purpose words of English to express himself in speaking reasonably clearly and correctly on routine matters.Develop a habit of reading with comprehension to achieve an optimum speed of 75 wpm Write reasonably and grammatically correct English

Enabling Objectives:

The students, after completing the course, will be able to
- Understand slowly delivered spoken material in Indian English.
- Understand general purpose words of English.
- Use general purpose words of English to express himself in speaking reasonably clearly and correctlyon routine matters.
- Write reasonably and grammatically correct English.
- Develop a habit of reading with comprehension to achieve an optimum speed of 75 WPM.

Communicate effectively in a professional environment through speaking and writing to achieve desired objectives.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	**Nature, process and importance of communication** Meaning of communication, Definition of communication, Functions and importance of communication, Process of communication	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – II	**Detailed study of the stories from the prescribed book** Writing summary, moral and characterization of any one story from the book prescribed	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – III	**Letter writing** Importance of letter writing, Lay out of business letter, Format of business letter, Letters of complaint /claim	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – IV	**Passages of comprehension** Steps for effective Reading, Meaning of comprehension	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic
Unit – V	**Composition and Translation** writing paragraphs of 150 words on topics of general interest, Translation (Hindi to English and vice-versa)	Usage of ICT (PowerPoint, Pdf and video lectures) and blackboard (traditional) as per the requirement of the topic

Course outcome:

Seeks to develop the students' abilities in grammar,oral skills, reading, writing and study skills. students should improve theirspeaking ability in English both in terms of fluency and comprehensibility

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TEXT BOOKS:

- English Conversation Practice — Grant Taylor
- Communication skills — M/S Somaiya Publication, Bombay
- English Grammar, Usage, and Composition — Tickoo & Subramanian, S. Chand

REFERENCE BOOKS:

- Communication for Business — Shirely Taylor — Longman, England.
- Effective Business Communication — M.V. Rodriques — Concept Pub. Co., New Delhi.
- Essentials of Business Communication — Dr. Rajendra Pal & J.S. Korlahalli — S.Chand & Sons, New Delhi

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide Speaking skills	Goal 04(Quality education)	

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SEMESTER- 3rd
Course: Diploma EE
SUBJECT: ELEMENTS OF ELECTRICAL ENGINEERING

Subject Code: 2TDEE301
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:-

- To provide knowledge of basic concepts related to electrical engineering.
- To provide knowledge of electrical engineering materials.
- To provide knowledge of capacitors, inductors and magnetic circuits.

	Unitwise Course Contents	Methodology Adopted
UNIT I	Concept of current (D.C./A.C.) Concept of voltage (D.C. /A.C.) (E.M.F.,Potential difference Terminal voltage), Concept of Resistance. (Properties., Classification of resistors based on ohmic value & material. ,Practical application of above types of resistors. ,Use of a rheostat in laboratory.), Concept of conductor, insulator, semiconductor.	Theory and practical.
UNIT II	Conducting materials & properties. Insulating materials &properties., Magnetic materials & properties. Semi Conduction materials & properties.	Theory and practical.
UNIT III	Concept of capacitor formation, expression for capacitance. Energy stored in capacitor. Dielectric loss. Dielectric materials used in capacitors, types of capacitors. Effect of dielectric media on capacitance. (Electric field strength, Electric flux density. ,Permittivity.) ,Expression for capacitance of parallel plate capacitor., Series & parallel combination of capacitors., Charging and discharging of capacitors (no derivation, only numericals),A.C./D.C. capacitors and applications.	Theory and practical.
UNIT IV	Different types of inductors Construction. Rise and decay of current in an inductor (No derivation, only numerical) Energy stored in inductor (No derivation, only numerical) Inductance in A.C. and D.C. circuits.	Theory and practical.
UNIT V	Magnetic field strength, Permeability. ,Reluctance.),Magnetic leakage, leakage coefficient. ,Magnetic circuits, Series & parallel circuits, Comparison of electric & magnetic circuits.	Theory and practical.

COURSE OUTCOME:- This course enables the student to understand the very basic facts, concepts and principles of electricity so that student will be able to apply the same for solving simple electric and magnetic circuit and which is the basic requirement to understand many other courses in this discipline.

List of Experiments:

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- Electrical engineering laboratory practices - Supply system & safety.

- Introduction to various measuring instruments.
- Difference between EMF, terminal voltage & voltage drop in practice.
- Application of rheostat as Regulator.
- Effect of series & parallel connection of two lamps on current, voltage, power dissipated & energy consumed in a given circuit.
- Study of various types of capacitors.
- Study of AC & DC voltage waveform from CRO.
- Study & analysis of varies resistance.
- Behavior of fuse under normal & abnormal (overload, short circuit) operating conditions.
- Study of charging & discharging characteristics of capacitor

TEXT BOOKS:

- Electrical Appliances (Ajwani, J.M. R.B. Publications, New Delhi).
- Study of Electrical Appliances & Devices(Bhatia, K.B. Khanna Publishers, Delhi)
- Principles of Electrical Engineering(Bhattacharya, Tata -McGraw-Hill, New Delhi)
- Elementary Electrical Engineering (Gupta, M.L.New Heights, New Delhi)
- A Textbook of Electrical Technology (Theraja, B.L. &Theraja, A.K., Chand and Co. New Delhi)
- Basic electrical Engineering (SahdevChaturvedi)

Job Opportunities	EmployabilitySkill development	**UNDP goals achieved**	Entrepreneurship opportunities
Lab Assistant	Achieving good Basic knowledge of electrical engineering .	Goal 4 (quality education), Goal 9 (industry, innovation and infrastructure)	By achieving the good knowledge of several types of machines ,one can start their own business of construction of several machine parts.

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SEMESTER- 3rd
Course: Diploma EE
SUBJECT: ELECTRIC CIRCUITS

Subject Code: 2TDEE302
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVES:

- To provide knowledge of Basic Electric Circuit Concepts.
- To provide the concept of conversion of electrical circuits to graphs for determination of current and voltages.
- To provide Knowledge of various theorems and its applications to circuits.
- To give the knowledge of analysis of network reduction and calculation of various parameters.
- To know the basic concepts of coupled circuits and network performance under resonance condition.
- To provide knowledge of three phases balanced and unbalanced Poly phase Circuits and measurement of three phase power.
- To provide the concept of non-sinusoidal waveforms and its impact on electrical circuits

Unit Wise Course Contents		**Methodology Adopted**
UNIT I	PRINCIPLE OF CIRCUITS- Ohms Law, Series & parallel Resistive Circuits Kirchhoff's voltage law, Kirchhoff's current law, Sign convention Application to simple circuits. ANALYSIS OF NETWORK USING CIRCUIT PRINCIPLES - Mesh current analysis, Node voltage analysis, (Numerical on D.C.)	ICT Based & green board based class room teaching
UNIT II	NETWORK THEOREMS Superposition theorems, Thevenin's theorem, Norton's theorem, Source conversion, Maximum power transfer theorem, Star delta transformation, (Numerical on D.C.)	ICT Based & green board based class room teaching
UNIT III	BASIC CONCEPTS OF A.C. CIRCUITS - Sinusoidal A.C. voltage generation, definition of various terms used in sine wave, response of basic R,L and C elements to A.C.	ICT Based & green board based class room teaching
UNIT IV	SINGLE PHASE A.C. CIRCUITS- Series A.C. Circuits. R-L, R-C, & R-L-C circuits, impedance, reactance, phasor diagram, power factor, average power, apparent power , reactive power, power triangle, series resonance, parallel A.C. circuits, R-L, R-C, & R-L-C circuits.	ICT Based & green board based class room teaching
UNIT V	THREE PHASE A.C. CIRCUITS-Generation of three phase emf, phase sequence, connection of three phase windings, Star connection & Delta connection, line & phase quantities in star connected load, line & phase quantities in delta connected load, power in three phase system with balanced star, delta connected load, advantage of poly phase circuits.	ICT Based & green board based class room teaching

COURSE OUTCOMES:

- Students will learn about the different types of electrical sources and networks
- Students will have knowledge of converting an electrical circuit into graph and will be able to analyze the circuit graphically.
- Student will analyse circuits with ideal, independent, and controlled voltage and current sources
- Student will be able to find out current through or voltage across any branch of a given Electrical network using theorems.
- Students will learn about series and parallel resonance conditions in series and parallel circuits and its impact on network voltage and current magnitudes.

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- Students will have knowledge of balanced and unbalanced poly phase circuits.
- Students will be able to analyze the behaviour of non-sinusoidal waveforms.

List of Experiments:

- Observe A.C. waveforms on CRO and find various quantities like:
    - Amplitude.
    - Average value.
    - R.M.S. value.
    - Frequency.

- Observe response of pure resistance to A.C.
- Observe response of pure Inductance to A.C.
- Observe response of pure capacitance to A.C.
- Determination of current & power factor in series R-L circuit. Draw phasor diagram.
- Determination of current & power factor in series R-C circuit. Draw phasor diagram.
- 7. Determination of current & power factor in series R-L-C circuit. Draw phasor diagram.
- Resonance in series R-L-C circuit.
- Verify line & phase values for star connection.
- Verify line & phase values for delta connection.
- Verify KVL and KCL for D.C. circuits.
- Verify superposition theorem for D.C.
- Verify Thevenin's theorem for D.C.
- Verify maximum power transfer theorem for A.C. & D.C.
- Verify Norton's theorem for DC.

REFERENCES BOOK:

- Circuits and Networks by Sudhakar
- Basic Electrical Engineering Chaturvedi-sahdev (Dhanpat rai & co.))
- Circuit theory A. Charabarti (Dhanpat rai & co.)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer	The ability to simplify and explain technical information to others Team working and team management experience Good project management skills Good organization and problem-solving skills	Goal 4 (quality education), Goal 9 (industry, innovation and infrastructure)	Battery Production, Battery store, Electrical Wire Manufacturing, Printed Circuit Board Making

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SEMESTER- 3rd
Course: Diploma EE
SUBJECT: BASIC ELECTRONICS

Subject Code: 2TDEE303
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:-

- The objective of this course is to provide knowledge about the fundamental of magnetic circuits, energy, force and torque of singly and multi-excited systems.
- This course is also to expose the students to basic principles, construction and working of synchronous and three –phase induction machines.
- The aim of this course is to give the knowledge of the equivalent circuits, parameter determination, operational constraints, starting mechanisms, conventional speed control methods, various tests and applications of synchronous and induction machines.

	UNIT WISE COURSE CONTENTS	METHODOLOGY ADOPTED
UNIT I	**Introduction to Semiconductor Devices** PN junction diode- concept of barrier potential, forward & reverse biasing, V-I characteristics & applications Zener Diode- Symbol, working principle, characteristics & applications Transistor- Basic structure, PNP & NPN types, transistor configuration ,characteristics, transistor biasing and applications.	Lectures, Demonstration of equipments. Exercises
UNIT II	**Rectifiers & Filters** Half wave rectifiers. Full wave rectifiers (Center-tap & Bridge).Ripple factor, PIV, rectification efficiency, comparison, merits and demerits of different types of rectifier.	Lectures, Demonstration of equipments., Exercises
UNIT III	**Feedback Amplifiers** Concept of feedback, Block diagram of feedback systems, feedback Factor, Types of feedback, strengths and limitations of negative feedback. Feedback connections: voltage- series, voltage-shunt, current-series, current-shunt, Single stage amplifier – working, effect of negative feedback.	Lectures, Demonstration of equipments, Exercises
UNIT IV	**Multistage Amplifiers** General block diagram of multi-stage amplifier, necessity of multistage amplifiers. Different coupling methods – working, frequency response, applications and comparison of: a) RC coupled, b) LC coupled, c) Direct-coupled, and d) Transformer coupled amplifiers.	Lectures, Demonstration of equipments. Exercise, flip chart, models , posters, slides and videos
UNIT V	**Tuned Amplifiers** Concept of resonance circuit, Concept of tuned amplifier, Single-tuned voltage amplifier, its frequency response and limitation. Double-tuned voltage amplifier, its frequency response and limitation.	Lectures, Demonstration of equipments. Exercises

COURSE OUTCOMES: After completing syllabus student will be able to:

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- Identify and explain the working principles of various semiconductor devices, relate their characteristics and applications
- Explain the characteristics of CB, CE and CC configuration circuits.
- Identify and explain the working of transistors in various configurations.
- Explain operation and function of large and small signal amplifiers with applications.

- Make simple power supplies and amplifiers and test related circuits.

List of Experiments:

- To draw the V-I characteristics of PN junction diode &Zener diode.
- To draw the Input output characteristics of Transistors.
- Study of the Half Wave Rectifier with filters.
- Study of full wave rectifier with filters.
- Study of Bridge Rectifier with filter.
- To design a regulator circuit using zener diode.
- To draw the characteristics of a zener diode.
- Study the Effect of negative feedback on single stage amplifier.
- Study the of RC coupled amplifier.
- Study the of Single tuned amplifier.
- Study the Double tuned amplifier.

TEXT BOOKS:

- Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman&Halkias, TMH.
- Electronic Devices and Circuit Theory – Boylestad&Nashelsky, 8th Ed. PHI.

REFERENCES BOOK:

- Basic Electronics & Linear circuts **(**Bhargava & Gupta, Tata McGraw Hill; New Delhi)
- Electronic Principles (Malvino, Tata McGraw Hill; New Delhi)
- Principles of Electronics (Mehta V.K., S. Chand & Co. Ltd)
- Electronic Devices & Circuits - Vol. 1(Mithal, G.K., Khanna Publishers

Job Opportunities	Employability Skill developed	**UNDP Goal Achieved**	Entrepreneurship Opportunity
Junior Engineer	Able to understand the construction, working principles of electronics instruments	Goal 8 (decent work and economic growth), Goal 9 (industry, innovation and infrastructure)	Start business Unit (retail and Micro).

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SEMESTER- 3rd
Course: Diploma EE
SUBJECT: ELECTRICAL DRAWING

Subject Code: 2TDEE304
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVES:

- Increase ability to communicate with people
- Learn to sketch and take field dimensions.
- Learn to take data and transform it into graphic drawings.
- Learn basic electrical symbols use for electric circuits.
- Learn engineering drawing formats for electric panels and boards.
- Prepare the student for future engineering positions.

Unit Wise Course Contents		Methodology Adopted
UNIT I	**Symbol and Codes** ISI Symbols in electrical engineering, conventions for circuit and schematic representation of electrical and electronic components, instruments and equipment	Lectures Demonstration of equipments. Exercises
UNIT II	**Mountings** Different types of mountings, Enclosures for electrical equipments, Panel wiring with CB, isolator, synchroscope, regulator etc, Plate & Pipe earthing.	Lectures Demonstration of equipments. Exercises
UNIT III	**Domestic Wiring** All types of light circuit, Fluorescent tube & fan circuit wiring Intermediate switch circuit.	Lectures Demonstration of equipments. Exercises
UNIT IV	**Instrument circuit** Connection of all types of meters (PMMC, Moving Iron, dynamo meter, Induction type). Extension of range using shunt, multiplier, CT, PT	. Lectures Demonstration of equipments. Exercises
UNIT V	**Cables** Cross-section of Cables, Power cable laying, cable joints.	Lectures

COURSE OUTCOME:-

- Student's ability to perform basic sketching techniques will improve.
- Students will be able to draw orthographic projections and sections.
- Student's ability to use architectural and engineering scales will increase.
- Students ability to produce engineered drawings will improve
- Student's ability to convert sketches to electric circuits.
- Students will become familiar with electric symbols and standards.
- Students will become familiar with electric panels and circuit boards drawings

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REFERENCES BOOK:

- Elementary Engineering Drawing (Bhatt, N.D,: Charoter Pub., Anand, Gujarat)
- Engineering Drawing (Gupta, R.B. Satya Prakashan, Delhi)
- Electrical Engineering Drawing (C.R.Dargan)
- Engineering Drawing Gujral and Shende, Khanna Pub. New.Delhi

Job Opportunities	Employability Skill developed	**UNDP Goal Achieved**	Entrepreneurship Opportunity
Electrician	Able to understand the electric circuits and different electric connections.	Goal 4 (quality education), Goal 7 (adorable and clean energy)	Start business Unit, Open shops related to electrical equipments.

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SEMESTER- 3rd
Course: Diploma EE
SUBJECT: RENEWABLE ENERGY SOURCES

Subject Code: 2TDEE305
Theory Max. Marks: 50
Theory Min. Marks : 17

COURSE OBJECTIVES : The objective of the courses is to develop in-depth knowledge for the following:

- Various renewable energy resources available at a location and assessments of its potential, using tools and techniques.
- Solar energy radiation, its interactions, measurement and estimation.
- Site selection for wind turbines, wind systems, measurements and instruments.
- Develop and read hydrographs, estimate flow, head, and power.
- Geothermal, wave, tidal and OTEC resources, site selection.
- Properties critical for Bio-energy resource assessment, pathway selection, biomass supply.

Unit wise Course Contents		Methodology Adopted
UNIT I	**Biomass Energy** Overview of biomass as energy source, Production of biomass, Classification of biomass, Biomass conversion routes: biochemical, chemical and thermo-chemical.	Chalk-board, models, flipchat, poster, slides & videos etc.
UNIT II	Solar Energy Solar thermal conversion, Solar radiation, Solar thermal Energy conversion: Conversion of heat into mechanical energy, Principle of photovoltaic conversion	Visiting the students to the solar-thermal power plants and other solar Equipments etc.
UNIT III	**Hydro Energy** Introduction to Hydropower, Classification of Hydropower Plants, Advantages and Disadvantages of Hydropower. Selection of site for hydroelectric plant, Hydrological cycle.	Visiting the hydro & wind power plants to the practical knowledges
UNIT IV	**Wind Energy** BasicPrinciplesofWindEnergyconversionSiteSelectioncriterion, winddata&energy estimation ,Environmental benefits and problems of wind energy, Economics of wind energy.	Video-audio lectures showing & Often guest lectures etc. in class rooms
UNIT V	New Energy Resources Need of energy systems and materials,Hydrogen Energy,FuelCell,OceanEnergy, Geothermal Energy, Magneto-hydro-dynamic (MHD) energy conversion	Individual presentation of slides etc by students in classroom.

COURSE OUTCOMES: After completing syllabus student will be able to use the tools and techniques used to assess the various renewable energy resources and its potential at any location across the globe, so that a student is able analyze a case quantitatively at the end of the term.

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REFERENCES BOOK:

- Mukunda HS. Understanding Clean Energy and fuels from biomass.Wiley-India Pvt. Ltd, 2011
- Rai GD. Non-conventional energy sources. Khanna Publication, 2001
- Goswami DY. Kreith F. Kreider JF. Principles of Solar Engineering, Taylor & Francis, 1999
- Jiandong T. Mini hydropower. John Wiley, 1997
- Wagner H. Mathur J. Introduction to Hydro energy Systems : Basics, Technology and Operation, Springer, 2011
- Johnson GL. Wind Energy Systems, (Electronic Edition), Prentice Hall Inc, 2006
- Burton T. Sharpe D. Jenkins N. Bossanyi E. Wind Energy Handbook. John Wiley, 2001
- Jain P. Wind Energy Engineering. McGraw-Hill 2011
- Tiwari GN. Ghoshal MK. Fundamental of Renewable Energy Sources, Narosa, 2007.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Project Engineer	Able to understand the applications of different energy sources	Goal 4 (quality education), Goal 9 (industry, innovation and infrastructure)	Business developed and get opportunity in renewable energy sources

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SEMESTER- 4th
Course: Diploma EE
SUBJECT: ELECTRICAL MACHINES I

Subject Code: 2TDEE401
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVES:-

- This course is classified under basic technology group is intended to enable the student understand the facts, concepts, principles, procedures for the operations, testing and maintenance of electric machines such as D.C. motors and transformers.
- To provide a comprehensive knowledge of various types of transformers, its construction, working principle and its testing.
- To provide a comprehensive knowledge of various types D.C. motors and generator.

	Unit Wise Course Contents	Methodology Adopted
UNIT I	**Single Phase Transformers** Construction of a single phase transformer, types of single phase transformers, principle of working, emf equations, voltage & current ratios, ratings of transformer, No load & on load operation, open circuit test, short circuit test, equivalent circuit diagram, regulation of a transformer, losses and efficiency, all day efficiency and numerical problem ,auto transformer.	Lectures Demonstration of equipments. Exercises
UNIT II	**Three Phase Transformers** Construction of a three phase transformer, classification of three phase transformers: - (Distribution of Power transformer), Ratings of three phase transformer, different types of transformer terminal connection, transformer Accessories.	Lectures Demonstration of equipments. Exercises
UNIT III	**Basic Concepts of D.C. Machines** Need, construction of D.C. machines, materials used for constructional parts.	Lectures
UNIT IV	**D.C. Generators** Types of D.C. generators, principle of working, emf equation, condition for building up emf in self excited generator, critical resistance, internal & external characteristics, armature reaction, commutation	Lectures Demonstration of equipments. Exercises
UNIT V	**D.C. Motors** Types of D.C. motors, principle of working, back emf equations, torque equations, speed torque characteristics, speed control of shunt & series motors, reversing of D.C. motors, necessity of starters (3 & 4 point), power stages of D.C. motors, losses & efficiency, condition for maximum efficiency..	. Lectures Demonstration of equipments. Exercises

COURSE OUTCOME:-

- At the closing stage of the course, the students will be able to know the fundamental laws of electrical transformers.
- At the closing stage of the course, the students will be able to know the various types of operational characteristics and applications of DC motors and generators.

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- This course will help the student to function confidently when he enters the world of work.

List of experiments:-

- To determine the equivalent circuit parameters of a single phase transformer.
- To determine the voltage regulation of a single phase transformer operating at lagging pf.
- To determine the efficiency of a single phase transformer under different loading condition.
- To perform the tests required for parallel operation of transformers.
- To perform parallel operation of two single phase transformer.
- To study the voltage/current ratios of single phase and three phase transformer.
- Study the performance of a single phase transformer by OC & SC test.
- Study the performance of an auto transformer.
- Study the performance of D.C. generator.
- Study the performance of D.C. shunt Motor.
- Study the performance of D.C. series Motor.
- Study the speed torque characteristics of D.C. shunt motor.

REFERENCES BOOK:

- Electrical Machines (Nagrath& Kothari; Tata McGraw-Hill, New Delhi)
- Electrical Machines (J.B.Gupta/ Ashfaq Hussain/ B.L.Therja)
- Electrical Technology – I (B.L.Thereja/S.Chand)
- Electrical Technology – II(B.L.Thereja/S.Chand)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Testing Engineer, Junior Engineer, Lab Assistant Design,manufacture ,construction of D.C machines.	Able to understand Understand the construction, working principles of D.C machines	Goal 9 (industry, innovation and infrastructure)	Electrical designing ,manufacturing industries e.t.c

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SEMESTER- 4th **Subject Code: 2TDEE402**
Course: Diploma EE **Theory Max. Marks: 50**
SUBJECT: ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS **Theory Min. Marks**: 17

COURSE OBJECTIVES:-

- This course enable the student to understand the facts, concepts, principles and test procedure of the measurement of electrical quantities and circuit parameters and also the circuits analysis.
- To acquaint with the fundamental concepts of electrical measurements and instrumentation.
- To provide practical, hands-on experience about how measure displacement, strain, inductance, capacitance using trainer kits.

Unit Wise Course Contents		Methodology Adopted
UNIT I	Introduction to Measurement • Measuring systems, Requirements, Classification of measuring instruments (Indicating, recording &integrating types), Accuracy, sensitivity ammeter Types of errors.	Theory and laboratory practices
UNIT II	Basic Concepts of Electrical Measuring Instruments Necessity of different torques and arrangement of torque producing System, general description of PMMC, moving iron, induction type, dynamometers type instruments.	Only theory and by ppt presentations.
UNIT III	Current & Voltage Measurement Principle of current and voltage measurement, Galvanometer, ammeter, voltmeter, extension of current range, voltage range, calibration of ammeter and voltmeter, dielectric measurement : by wattmeter, by CRO.	Laboratory practices .
UNIT IV	Power Measurement and insulation measurement Principle of power measurement and energy measurement, types of wattmeters and energy meters, extension of wattmeter range, power measurement in three phase, effect of P.F. on the wattmeter measurement, earth tester, megger.	Theory
UNIT V	A.C. Bridges Measurement of different types of resistances by bridge methods, Measurement of frequency by Weins bridge, measurement of inductance by Anderson & Maxwell bridge circuit, measurement of unknown capacitance by Schering bridge.	Theory and practices.

COURSE OUTCOME:-

- At the closing stage of the course, the students will be able to know the fundaments of electrical measurements.
- This course will also help to build in the student the analytical skills that will enable him/her in doing and guiding, estimating investigation which in turn will help him/her to discharge the role as a supervisor or as a entrepreneur.

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List of experiments:-

- Study of different meters, such as: Ammeter, voltmeter, wattmeter & energy meter.
- Measurement of electrical quantities by low range meter along with CT.
- Measurement of active & reactive power in 3-phase balance load circuit by one wattmeter method.
- Measurement of active & reactive power in 3-phase unbalance load circuit by two-wattmeter method.
- Calibration of energy meter at various P.F. by Standard energy meter.
- Measurement of low & medium resistance by Wheatstone bridge.
- Measurement of low resistance by Kelvin double bridge.
- Todetermine unknowninductance ofa givencoilbyMaxwellBridge Method.
- Todetermine the inductance ofthegivencoilbyAndersonBridge Method.
- Todetermine capacitance ofagivencapacitor byScheringBridge Method.
- Measurement of earth resistance by Earth Tester.
- Measurement of insulation resistance by Megger.
- Use of potentiometer for the measurement of Resistance

TEXT BOOKS:

- Electronic instrumention& measurement techniques (Cooper, W.D. &Helfrick,A.D.,New Delhi :prentice Hall of India)
- Electrical & Electronic measurement instrument (Rambhadran, S,;Delhi: Khanna Publishers)
- A course in electrical & electronic measurements and instrumentation (measurements and instrumentation rai & sons).
- A course in Electrical & Electronic Measurements & Instruments (Sawhney; Dhanpatrai& Sons).

Job Opportunities	Employability Skill development	**UNDP goals achieved**	Entrepreneurship opportunities
Junior Engineer, Lab Assistant	Identification of several measuring instruments. Learning of working of measuring instruments. Getting knowledge of Application of several measuring instruments.	Goal 4 (quality education),	By achieving good knowlwdge of measuring instruments ,constructing business of measuring instruments can be started.

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SEMESTER- 4th **Subject Code: 2TDEE403**
Course: Diploma EE **Theory Max. Marks: 50**
SUBJECT: DIGITAL ELECTRONICS **Theory Min. Marks**: 17

COURSE OBJECTIVES:-

- This course is to enable the student understand the facts, concepts, principles and procedures of digital techniques and their application used in digital circuits & systems.
- To acquaint with the fundamental concepts of Digital Electronics and Digital Instruments.
- To make them understand concepts of different types of analog and digital circuits.

	Unit Wise Course Contents	Methodology Adopted
UNIT I	**Introduction to Digital Techniques & Digital Codes** Numerical representations, Comparison of digital and analog systems. Number systems: Binary, Decimal, Octal & Hexa-decimal,Conversion of one number system to others, Binary addition, subtraction, multiplication and division ,Use of 1's and 2's compliments in binary arithmetic **Binary codes:** BCD numbers, 8421 BCD code, Excess-3 codes and Gray code.	Lectures, Demonstration of equipments. Exercises
UNIT II	**LogicGates**Basic logic gates: NOT, AND, OR gates using semiconductor diodes & BJTs symbol, truth table, logic equation applications, Universal logic gates: NOR, NAND gates using semiconductor, diodes and BJTs symbol, truth table, logic equation, basic logic gates, using universal logic gates, Ex-OR and Ex-NOR gates.	Lectures, Demonstration of equipments. Exercises
UNIT III	**Boolean algebra** Fundamental concepts & their basic laws-AND, OR, complementation, cumulative, Associative and distribution laws, De'Morgan's theorems and numerical examples, standard forms for Boolean function, SOP and POS and their conversion to standard forms, Karnaugh (k) map reduction techniques for 2 and 4 variables only.	Lectures
UNIT IV	**Digital Systems** Introduction: types of digital systems and their block diagram, operating principles, combination Logic system: R-S flip-flop using BJTs, NOR and NAND gates clocked R-S flip-flop, propagation delay and Race around condition, Master-Slave (M-S) J.K. flip-flop with preset and clear.	Lectures, Demonstration of equipments., Exercises
UNIT V	Multiplexers/ De-multiplexers & Arithmetic Logic Unit Principles of Multiplexers and their types 2 to 1, 4 to 1, 8 to 1 and 16 to 1 lines, block diagrams, operating principles and applications, principles of de-multiplexer and their types 2 to 1, 4 to 1, 8 to 1 and 16 to 1 lines, block diagrams, operating principles and applications. ALU: Introduction, Adders – Half and full adders, series and parallel binary adders, Subtractors – Half and full subtractor.	. Lectures, Demonstration of equipments. Exercises

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COURSE OUTCOME:-

- Able to understand basic concepts of digital electronics, sequential and combinational circuits.
- Able to implement the concepts of digital electronics in electronic measuring instruments.
- This understanding will help in prototype testing and thereby the investigation skills, which in turn, will help him/her in performing the role of a supervisor in all technology areas and also assist those working under him.

List of experiments:-

- Study of NOR and NAND gates as universal.
- Realization of Boolean expression using NAND or NOR gates.
- Verify De'Morgan's theorems.
- Study of IC logic gates - pin.
- Study of R-S flip-flop.
- Study of IC J-K M-S flip-flop.
- Study of 4-bit ripple counter using IC 7476.
- Study of multiplexer ICs.
- Study of demultiplexer ICs.
- To construct a half adder circuit.
- To construct a full adder circuit.
- To construct a half subtractor circuit.
- To construct a full subtractor circuit.

REFERENCES BOOK:

- Digital Electronics Practical (Jain, R.P.; Tata McGraw-Hill, New Delhi)
- Digital Principles and Application (Malvino& Leach, Tata McGraw-Hill; New Delhi)
- Modern Digital Electronics(Jain, R.P.; Tata McGraw-Hill, New Delhi)
- Laboratory Manual and Teacher Guide in Digital Electronics (TTTI, Bhopal and DTE, Goa)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer, Lab Assistant Design , manufacture electronics or electrical industries	Able to understand the construction, working principles of electronics instruments	Goal 8 (decent work and economic growth), Goal 9 (industry, innovation and infrastructure)	Start business Unit (retail and Micro).

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SEMESTER- 4th **Subject Code: 2TDEE404**
Course: Diploma EE **Theory Max. Marks: 50**
SUBJECT: GENERATION TRANSMISSION AND DISTRIBUTION **Theory Min. Marks: 17**

COURSE OBJECTIVES:-

- To under the concepts of various methods electrical energy generation
- To learn the usage of passive elements in various power transmission system
- To understand the factors affecting insulators and also in underground cables
- To calculate the various parameters in distribution system
- Suggest methods for power factors improvement

Unit wise course contents		Methodology Adopted
UNIT I	Generation of Electrical Power Introduction an overview of a generalized power system, Single line diagram of power generation systems, Thermal , Hydro, Nuclear, Diesel, MHD Power Plants, Line and block diagram of all power plants, comparison of different power plants.	Chalk-board ,slides,poster&models presentation in the class rooms
UNIT II	Variable Loads on Power Plants Variable load on power plants, Load curves, Selection of size and number of units, Base load and peak load.	Guest lectures should be organised in class
UNIT III	Economics of Power Generation Interest and depreciation, cost of electrical energy, method of determining depreciation, importance of high load factor.	Visiting the different power plants by the students
UNIT IV	Tariff Introduction of tariff, types of tariff – simple, flat rate, block rate, two part, maximum demand, power factor, three part.	Pratical measurement of tariff by the energy meter in domestic system
UNIT V	Transmission Line Parameters Line Resistance and Inductance, capacitance, skin effect and effect of proximity, classification of transmission lines, performance of transmission lines, voltage regulation and efficiency, equivalent circuits, Ferranti effect, line losses on open circuits.	Showing and given the task for study of different transmission lines etc.

COURSE OUTCOME:-

- Analyze the performance of various units involved in the power plants
- Apply power system fundamental s to the design of a system that meets specific needs
- Desgn a power system solution based on the problem requirements and realistic constraints
- Develop a major design experience in power system that prepares engineering practices.

REFERENCES BOOK:

- Power system engineering(Nagrath; Tata McGraw-Hill, New Delhi)
- A course in electrical power (Soni M.L., Gupta J.L.; Dhanpat Rai & Sons, New Delhi)

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- A text book of electrical power (Uppal S. L.; Khanna publisher, New Delhi)
- Generation, Distribution & Utilization of Electrical Energy (Wadhwa, C.L.; Wiley Eastern Ltd., New Delhi)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer Job in executives in the private sectors and also in the organizational sectors etc.	Able to understand the load and working of different power plants. In future can do as skilled engineer &technicals etc.	Goal 4 (quality education), Goal 9 (industry, innovation and infrastructure)	Generate the job opportunities in the development of different power plants etc.

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SEMESTER- 4th
Course: Diploma EE
SUBJECT: INDUSTRIAL MANAGEMENT

Subject Code: 2TDEE405
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVES:-

- To provide an understanding of the theories and principles of modern management and encourage the course participants to make an appreciation of these principles in relation to their own experiences and selected managerial case studies.
- To understand the basic principles of management, and the four major functions of managers e.g. planning, organizing, leading and controlling and how managers actually operate.
- Students will be required to think critically and strategically about management theories and issues which will enable them to develop their decision-making and analytical skills.
- They will be involved in application exercises and case studies which will assist them to develop graduate attributes.

	Unit Wise Course Contents	Methodology Adopted
UNIT I	**MANAGEMENT& SYSTEM THINKING CONCEPTS** Management- definition, activities, theories-Decision, quantitative, mathematical, behavioral sciences, system definition and parameters, production system, non-production system and objectives, system design, procedure, system variables.	Lectures, Demonstration of equipments. Exercises
UNIT II	**MATERIALS MANAGEMENT** Introduction & function of purchase system, inventory, need & advantages of inventory control, correlation, stock turn over, order quantity, lead time purchase cycle. **Stores Management**-Definition and importance, storing procedure and store records.	Lectures Demonstration of equipments. Exercises
UNIT III	**PRODUCTION PLANNING AND CONTROL** Production system, concept of planning, job, batch and mass production, batch size, buffer stock, production cost components, concept of production scheduling, difference between loading & scheduling, Gantt chart scheduling, advantages and preparation of GANTT chart.	Lectures Lectures Demonstration of equipments. Exercises
UNIT IV	**INDUSTRIAL RELATIONS** Scope, definition, need, objective and function of personnel management, job analysis, job description, man power as resources, recruitment, selection, training and terminal behavior in an organization, motivation, meaning and its benefits, factors responsible for lack of motivation, techniques to boost the motivation in workers, job satisfaction, social and economic values, factors influencing job satisfaction.	. Lectures Demonstration of equipments. Exercises
UNIT V	**SUPERVISION AND LEADERSHIP** Meaning and role of supervisor in an industry, need of supervision, older workers and their supervision, concept of leadership, qualities of a good leader, effectiveness of leadership system.	

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COURSE OUTCOME:-

- Students will be able to perform the Management Functions.
- Students will be able to compare selected Theories of Management.
- Students will be able to perform the functions in the Marketing Mix.
- Students will be able to assess ethical issues in Business situations.

REFERENCES BOOK:

- Industrial Engineering and Management (O.P. Khanna)
- Industrial organization and management Ahuja.
- Project Engineering and Management A.K.Sinha& Rama Sinha.
- Manpower Management R.S. Diwedi.
- Personnel Management and Industrial Relations R.S. Davar.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer, Management Trainee, Project Engineer Job in executives in the private sectors and also in the organizational sectors etc.	Able to understand the industrial management	4 Goal 4 (quality education), Goal 9 (industry, innovation and infrastructure)	Generate the job opportunities in the development of different power plants etc.

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SEMESTER- 5th
Course: Diploma EE
SUBJECT: INSTRUMENTATION AND CONTROL

Subject Code: 2TDEE501
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- The course focuses on imparting the principles of measurement which includes the working mechanism various sensors and devices, that are in use to measure the important physical variables .
- To give the knowledge about the various components analog signal conditioning
- To make students understand the construction, working principle and application of various transducers use for flow measurement, strain measurement, pressure and vacuum measurement, force, torque and pow measurement.

Course Content		Methodology Adopted
UNIT-I	Elements of measuring system , Time lag error, Distortion, Noise, Noise factor Transducers ,Importance & Characteristics , Types & working principle , Application of Transducer (active & passive) , Moving coil, microphone, thermocouple, photoelectric, piezoelectric [strain guage, potentiometer] , Inductance (differential, mutual), LVDT, capacitive & frequency generating	Practical and theory.
UNIT –II	Purpose & classification , Input modifier, frequency range DC amplifier, chopper & instrumentation amplifier ,Potentiometer & bridge devices(self balance, 8 deflecting type)	Practical and theory.
UNIT –III	End devices , Types of Indicators {digital,7-segment LED, Nixie tube ,LCD} ,Types of Recorders {printer, magnetic tape & floppy disc}	Practical and theory.
UNIT –IV	, Measurement of non-electrical quantities by electrical methods , Pressure measurement- Pressure actuator , Pirani guage, LVDT, Thermocouple guage, Strain guage ,Capacitive transducer , Temperature & Photoelectric Measurement –Resistance thermometer, Thermistor, Optical & Radiation Pyrometer , Flow measurement- electromagnetic flow meter , Level measurement- Potentiometer, Capacitive , Photoelectric , Speed & Vibration measurement- Frequency generating transducer,Velocity& Acceleration measurement-	Practical and theory.
UNIT V	Frequency generating transducer, inductive and capacitive transducer Humidity ,PHcell& PH meter , Gas analysis ,Definition of variables , Open loop & Closed loop system with Block Diagram , Servo-mechanism, On- Off control system.	Practical and theory.

COURSE OUTCOMES:

- After undergoing the course the student can select appropriate device for the measurement of parameters lil temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristi and performance.
- The course would enable the students to explain principle of analog signal conditioning circuits.

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- Explain working principle of strain gauges.
- Explain working principle of pressure transducers 3. Learn transducers for vacuum measurement.
- Identify types of flow and use different transducers for flow measurement.
- Explain the terminologies of electrochemical sensors and their applications in industry.

List of experiments:

- Measurement of linear displacement by LVDT.
- Measurement of liquid level by capacitive transducer
- Measurement of pressure by LVDT.
- Measurement of angular displacement by capacitive transducer.
- Measurement of displacement inductive transducer.
- Measurement of temperature using Optical/ Radiation Pyrometer.
- Measurement of pressure by strain gauges.
- Measurement of Angular displacement by synchronous.

REFERENCES BOOK:

- Electrical & Electronics Measurement & Measuring Instrumentation(A. K . Shawhney)
- Intrumentation& Devices (Sharma & Mani Rangan)
- Process Control (Harriot , TMH Edition)
- Electronic Intrumentation(Prensley, Printice Hall)
- Mechanical & Industrial measurement (RK Jain, Khanna Publication

Job Opportunities	Employability Skill development	UNDP goal achieved	Entrepreneurship opportunities
Junior Engineer Jobs in many government well as private sectors.	Learning of working of instruments. Getting knowledge of Application of several instruments and control	Goal4(quality education),Goal9 (industry, innovation and infrastructure)	By achieving good knowlwdge of instrum ,constructing business instruments can be ste

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SEMESTER- 5th
Course: Diploma EE
SUBJECT: POWER ELECTRONICS

Subject Code: 2TDEE502
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVES:

- To understand and develop the firing circuit requirement for different power semiconductor devices used as switches.
- To understand the concepts of different types of AC-DC, DC-DC & DC-AC controlled converters for Industrial applications.
- To analyze the effect of controlled and uncontrolled converters in Power system and their mitigation.
- To design and develop the commutation circuits for semi controlled power semiconductor devices.
- To understand the rating specification for design and development of the protection circuits for Semiconductor devices.

UNIT WISE COURSE CONTENTS		METHODOLOGY ADOPTED
UNIT 1	**Thyristor** Siliconcontrolledrectifier(SCR),constructionandprincipleofoperation,two-transistoranalogy, staticand dynamic characteristics,gatecharacteristics,ratings,series and parallel operation of SCRs,overvoltage andovercurrent protections, protectionagainsthighdi/dtandhighdv/dt,useof UJT for pulsegeneration.	Lectures Demonstration of equipments. Exercises
UNIT II	**PhaseControlled Rectifiers** Principleofphase control,performanceparameters,single-phasehalfwaveandfullwave controlled rectifiers,mid pointandbridgeconverters,fullcontrolledconverters,halfcontrolledconverters,comparisonbetweenfulland half controlledconverters,three-phasehalfwaveandfullycontrolledbridgeconverter,three-phasesemi-converter,effectandsourceinductanceinsingle-phaseandthree-phasebridgeconverters,commutationoroverlapangle,effectofoverlap.	Audio – visual aids such as – chalk board , flip chart, models , posters, slides and videos.
UNIT III	**DCTo DCConversion** Principleofchopperoperation,controlledstrategies,stepupchopper,stepdownchopper,chopper configuration, forcedcommutedchopper,voltagecommutatedchopper,currentcommutedchopper,Load commutedchopper,Jone's chopper,Morganchopper.	Individual presentation on discussed topics. Group discussion.
UNIT IV	**Inverter** Classification of inverters, voltage source inverter, current source inverter, series resonant inverter, modified series resonant inverter, parallel inverter, bridge inverter, auxiliary commuted single-phase inverter, complementary commuted singe-phase inverter, and three-phase inverter, Cyclo-converters: basic principle of operation, step-up and step down single-phase to single-phase Cyclo-converter.	Lectures Demonstration of equipments. Exercises
UNIT V	**SpeedControlOfDCMotors** Four-quadrantoperationofseriesandshuntDCmotors, constantHPandconstanttorque operation,various schemes ofspeedcontrol(singleconverter,doubleconverter,chopper),modernsemiconductodevices,power transistors, power bipolar junction transistors, steady state	

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	characteristics, switching characteristics, switching limits, safeoperatingarea, power MOSFET: steady state characteristics, switching limits, safe operating area, IGBT: steady state characteristics, safe operating area.	Audio – visual aids such as – chalk board , flip chart, models , posters.

COURSE OUTCOMES:

- To gain knowledge of various application of semiconductor switches by understanding their static and dyr characteristics.
- To understand the performance characteristics of controlled AC-DC converters for R, RL & RLE loads.
- To gain knowledge on basic DC-DC converters and their operation under continuous /discontinuous mode of condu for RLE loads
- To identify and formulate the requirements for four quadrant operation of DC motor.
- To differentiate and understand the significance of various commutation circuits and their consequence on device st
- To understand the principle of DC-AC conversion and the different topology for three phase to three phase and s phase to single phase DC-AC conversion.

List of experiments:

- Study of UJT trigger circuit to SCR.
- Study of different methods of forced commutation of SCR.
- To perform single phase full wave controlled bride Rectifier.
- To perform 3- phase half wave controlled bride Rectifier.
- To perform 3- phase full wave controlled bride Rectifier.
- To perform Dv/dt protection circuit.
- To perform diac/triac circuit.
- To perform speed control of series motor.
- Study of microprocessor (Pin configuretion.)
- Study of micro controller.
- Implementation of microprocessor of I/O's on bread board.
- Study of DC chopper power circuit.
- Study of Series inverter circuit.
- Study of parallel inverter circuit.

TEXT BOOKS:

- Power Electronics Circuits, Devices and Applications: Muhammad H. Rashid, PHI
- Power Electronics: P.S. Bhimbra, Khanna Publishers.

REFERENCE BOOKS:

- Power Electronics Converters, applications and Design: Mohan, Undeland, Robbins, John Wiley& Sons
- A text book of Power Electronics: S.N Singh, DhanpatRai& Co.(P)Ltd.
- An Introduction to Thyristor and its applications: M. Ramamoorty, East-West Press.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Lab Assistant, Junior Engineer Design in large electrical and electronics sector.	Able to understand the construction, working principles of large electrical and electronics sector.	Goal 8 (decent work and economic growth), Goal 9 (industry, innovation and infrastructure)	Start business Unit (retail and Micro).

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SEMESTER- 5th
Course: Diploma EE
SUBJECT: ELECTRICAL MACHINES II

Subject Code: 2TDEE503
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- To provide a comprehensive knowledge of various types induction machines, alternators, synchronous machines.
- To make them understand concepts of different types of AC machine.

UNIT WISE COURSE CONTENTS		METHODOLOGY ADOPTED
UNIT 1	**Introduction to A.C Machines** Overview of AC machines,Difference between A.C. & D.C. Machines	Lectures
UNIT II	**Basic Features of A.C. Machines** Parts of A.C. Machine & their functions,Materials used for the various parts,Stator & rotor windings	Lectures Demonstration of equipments. Exercises
UNIT III	**Alternators** Types of alternators Principle &emf equation Winding factors & its effect on induced emf Effect of frequency on induced emf]Effect of speed & excitation on induced emf Different excitation systems Excitation system used in modern alternators Concept of leakage, armature & synchronous reactance Principle of working of brushlessalternators,Applications.	Lectures Demonstration of equipments. Exercises
UNIT IV	**A.C. Motors** Types of A.C. motors Stator & rotor parts, functions, windings Concept of rotating magnetic fields Stator & rotor current equations Effect of frequency on slip Torque equations Condition for maximum torque,Torque speed curves Circle diagram Necessity of induction motor starters and different types Methods of speed control of induction motors Different types of induction motors .	Lectures Demonstration of equipments. Exercises .Lectures Demonstration of equipments. Exercises
UNIT V	**FHP Motors** Construction of Fractional Horse Power (FHP) motors low power I/MStarting methods of Fhp Motors Principle of working of FHP motorsApplication of Fhp Motor.	

COURSE OUTCOMES:

- At the closing stage of the course, the students will be able to know the fundamental laws of electromechanical e conversion.

List of experiments:

- To determine the torque speed characteristics of ac motors.
- To determine the voltage regulation of ac machines.

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- To determine the speed control of induction motors.
- To determine the armature reactance of alternators.
- To determine the synchronous reactance of alternators.
- Study the circle diagram of ac motors.
- Study the different types of induction motors.
- Study the condition for maximum torque on ac motors.
- Study the performance of FHP motors.

REFERENCES BOOK:

- Electrical Machines(Bhattacharya, S.K., Tata McGraw-Hill, New Delhi)
- Electrical Machines(Bimbhra, P.S.; Khanna Publishers, New Delhi)
- Electrical Machines(Nagrath& Kothari, Tata McGraw-Hill, New Delhi)
- Elementary Electrical Engineering(Gupta, M.L., New Heights, New Delhi)
- Basic Electrical EngineeringMittle, V.N., Tata McGraw-Hill, New Delhi)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer, Maintenance Engineer Design , manufacture ,construction of A.C machines.	Able to understand the construction, working principles of A.C machines	Goal9(industry, innovation and infrastructure)	Electrical designing ,manufacturing industries e.t.c

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SEMESTER- 5th
Course: Diploma EE
SUBJECT: ESTIMATION AND COASTING

Subject Code: 2TDEE504
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- The course focuses on imparting the principles of measurement which includes the working mechanism various sensors and devices that are in use to measure the important physical variables.
- To give the knowledge about the various components analog signal conditioning
- To make students understand the construction, working principle and application of various transducers use for flow measurement, strain measurement, pressure and vacuum measurement, force, torque and pow measurement.

UNITWISE COURSE CONTENTS		METHEDOLOGY ADOPTED
UNIT-I	Elements of Estimating and Costing Types of estimation and estimation tools , Overhead and service charges , Purchase procedure . Domestic and Industrial Wiring Layout and wiring diagram for residential building, Layout and wiring diagram for industrial wiring, Estimation for residential wiring and industrial wiring, IE rules observed for above wiring	Theory ,vistit for wiring .
UNIT –II	Domestic and Industrial Service Connection Survey work for domestic and industrial service connection ,Wiring diagram of domestic and industrial service connections, Specifications of materials and accessories for service connection, Estimation of service connection for domestic and industrial (1phase and 3 phase) service connections	Survey work .Theory .
UNIT –III	Overhead and Underground Distribution System Planning and layout of overhead electrical distribution, Specifications of materials and accessories for overhead project, Planning and layout of underground electrical distribution, Specifications of materials and accessories for underground project, Drawings of overhead and underground service connection, IE rules pertaining to above project	Theory and visit.
UNIT –IV	Maintenance of Electrical Equipment Estimation of repairs, servicing and testing cost including labour cost (service charge),Tools used for repairs & testing work, Detailed estimation and preparation of cost schedule for repair and maintenance of electric fan, automatic electric iron, single-phase transformer, mixer, D.O.L. starter etc	Practical and theory.
UNIT –V	Principle of Contracting Terms, Conditions & types of contract system, types of tenders, tendering procedure and prepration of single tender, terms & conditions of tender, procedure for inviting and scrutinizing of tender, importance of earnest money deposit,	Theory.

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	security deposit and S.O.R.	

COURSE OUTCOME:

- At the closing stage of the course, the students will be able to know the fundaments of different electric wiring.
- They will be able to understand the estimating and costing of electrical equipment, contracting procedure electrical engineering etc.

TEXT BOOKS:

1 Electrical estimating and costing (Bajpai, M.N., Saroj Publication, New Delhi)
2. Electrical costing, estimating and contracting (Bhattacharya, S.K., TTTI, Chandigarh)
3. I.E. rules (Central Law Agency, Allahabad)
4. S.O.R (P.W.D. Govt. Deptt.)5. Electrical wiring, estimating and costing (Uppal, S.L., Khanna Publisher, New Delhi

Job Opportunities	Employability Skill development	UNDPgoals achieved	Entrepreneurship opportunities
Maintenance Engineer, Electrical Contactor, Project Engineer Jobs in many government as well as private sectors. Opportunity to do work as contractor.	Learning of preparing estimates Learning of preparing S.O.R(schedule of rates.)	Goal4(quality education), Goal 9 (industry ,innovation and infrastructure)	Entrepreneurship : Can start own venture. Employability skill: Time management. Speaking Cooperating Presentation skill.

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SEMESTER- 5th
Course: Diploma EE
SUBJECT: POWER SYSTEM OPERATION AND CONTROL

Subject Code: 2TDEE505
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVES:-

- To understand the electrical power plant operation and control with respect to its economic aspect.
- To know the importance of power system parameters and their solution techniques.
- Study about different faults and their protection those are introduced in power System.
- To study the protection required against line transients and determine the appropriate methods of Compensation required for operational stability

UNIT WISE COURSE CONTENTS		METHODOLOGY ADOPTED
UNIT 1	**Introduction to power system** Growth of power system , Various elements of power system ,Necessity and advantages of interconnection **Representation of power system** Single line diagram with standard symbol, Definition and advantages of Per Unit system ,Conversion of PU values from one base value to other base value ,Generalized ABCD constants and their characteristics, Values of constants in terms of circuit parameters. Proof of (AD-BC) =1 ,Relation of Zso, Zss, Zro, Zrs	Lectures Demonstration of equipments. Exercises Audio – visual aids such as – chalk board , flip chart, models , posters, slides and videos.
UNIT II	**Symmetrical Components** Operator a and j Resolution of unbalanced three phase system in to balanced three phase system Relation between Symmetrical and unsymmetrical components ,Phase sequence impedance and network Analysis of L-G, L-L, L-L-G and L-L-L and their calculation	
UNIT III	**Power System Stability And Reliability** Meaning & Necessity of stability ,Types of stability & Factors affecting stability Stability limit & Methods of improving stability ,Elementary two M/C system ,Power angle cycles ,Equal area criterion, Swing equation, Reliability & factors affecting reliability, Methods of improving reliability	Individual presentation on discussed topics. Group discussion.
UNIT IV	**Economic Operation of Power System and load flow study** Incremental fuel cost ,Optimum Loading on two units in a plants, Transmission loss as a function of plant generation , Objectives of load flow , Bus classification	Lectures Demonstration of equipments. Exercises
UNIT V	**HVDC/HVAC System** Merits & Demerits Types of DC links Controlled Rectification & Filters Reactive Power requirements Controlled characteristics	Audio – visual aids such as – chalk board , flip chart, models , posters.

COURSE OUTCOME:-

After completion of syllabus students will be able to :

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- Identify and explain the different methods of generation, distribution, control and Compensation involved in the operation of power systems.
- Design the mathematical models of the mechanical and electrical components Involved in the operation of power systems.
- Specify the equivalent electrical parameters of transmission line to prepare and analyze models to predict the range and ratings of the equipments to be used.

REFERENCES BOOK:

- Power System Protection and Switchgear (Badriram/ Tata McGraw-Hill, New Delhi)
- Electric Power System (Ashfaq Hussain)
- Electrical Power System(Mehta, V.K., Khanna Publishers, New Delhi)
- Testing, Commissioning, Operation and Maintenance of Electrical Equipment (Rao, S. Tata McGraw-Hill, New Delhi)
- ABS Course in Electrical Power(J. B. Gupta , Kalson Pub. ,Ludhiana)
- ABS Course in Electrical Power(Soni , Gupta , Bhatnagar ,Dhanpat Rai & Sons)
- Electrical Power(Uppal, S.L., Khanna Pub. New Delhi

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer Design , manufacture industrial machinery or power supply, power control and management system .	Able to understand the working principles of power system Control panels.	Goal 8 (decent work and economic growth), Goal 9 (industry, innovation and infrastructure)	

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SEMESTER- 6th | **Subject Code: 2TDEE601-A**
Course: Diploma EE | **Theory Max. Marks:50**
SUBJECT: ELECTIVE (A)- SWITCH GEAR AND PROTECTION | **Theory Min. Marks**:17

COURSE OBJECTIVES: To acquaint with the knowledge of basic elements of power system protection.

Unit Wise course content		Methodology Adopted
UNIT-I	**Principles of Protection** Line diagram of a power system and its elements ,faults and abnormalities, their causes, Types and effects, functions of basic elements of a protective system, backup protection and its types, importance of neutral earthing, methods of neutral earthling and its advantages	Lectures Demonstration of equipments .Exercises ,Audio visual aids such as chalk board.
UNIT –II	**Over Voltage Protection** Causes and effects of over voltages,Methods of reducing over voltages, Types , operating principles, applications of lightning arrestor ,Surge absorber	Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board.
UNIT – III	**Protective Relays** Concept of protective relaying ,classification of relays and their selection construction and working principle of relays electromagnetic, induction, reverse power, differential, distance, IDMT, & thermal relay , settings of various types of relays causes of failure of primary relaying ,use & types of backup relays in power system	Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board. Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board.
UNIT – IV	**Instrument Transformers** Instrument transformers used for protection polarity marking of CT & PT and their specifications connection diagram of CT & PT in a 1-phase and 3-phase protective systems	Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board.
UNIT –V	**Circuit Interrupting Devices and protection schemes** Necessity and types of interruption devices like ACB, OCB, AB Switch, SF6 and vacuum circuit breakers& their working principle , Arc formation in CB& methods of arc extinction , requirement and types of isolators ,difference between isolators & CB ,types of fuses and their characteristic ,abnormalities and faults in a power system and its effects ,protection schemes for alternator, protection of transformers ,protection of transmission line and feeders ,protection of induction motors	

COURSE OUTCOMES: At the closing stage of the course, the students will be able to understand the different

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protective systems like relays, transformers and their working.

List of experiments:-

- Use overload relay and obtain it's time-current characteristic
- Use Buchholz relay for transformer protection
- Use thermal overload relay for protection of motor and set the relay property
- Check the polarity of CT & PT and connect it with the relay
- Apply the balance current protection scheme using appropriate switch gear
- Find the fusing factor of a given fuse material
- Operate air break switch in a simulated condition

- Read and interpret the protection scheme for an alternator in power station (from blue print and visit)

- Read and interpret various protective scheme used for transmission lines and feeders (from blue print and visit)

- Draw schematic diagram of protective schemes for 66KV, 132KV, 220KV sub station (after visit)

- Visit a substation and prepare its technical report emphasizing on control side.

TEXT BOOKS

- Power System Protection and Switchgear(Badriram/ Tata McGraw-Hill, New Delhi)
- Switchgear and Protection Deshpande/ Tata McGraw-Hill New Delhi)
- Electrical Power System(Mehta, V.K., Khanna Publishers, New Delhi)
- Testing, Commissioning, Operation and Maintenance of Electrical Equipment (Rao, S. Tata McGraw-Hill, New Delhi)

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer, Testing Engineer, Maintenance Engineer, Safety Engineer, Electrical Contactor Design engineer in various electrical production and contractor companies	Able to understand the Protection design and its rquirement	Goal 1(No Poverty),Goal 2 (Zero hunger), Goal 4 (Quality Education)	Start business for consultancy.

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SEMESTER- 6th
Course: Diploma EE
SUBJECT: ELECTIVE (B)-ELECTRIC TRACTION

Subject Code: 2TDEE601-B
Theory Max. Marks: 50
Theory Min. Marks: 17

COURSE OBJECTIVE:

- To provide the students the fundamental concepts of drives and types of drives used in traction.
- To train the students with a good engineering breadth so as to analyze the accessing techniques for braking system implementation in traction.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	General Description of Electric Traction system in India- Electric Traction – advantage and disadvantages. Choice of traction system in India. System of Track Electrification. Description of various systems - D.C., 1-Phase low frequency A.C., 1-Phase high frequency, 3-Phase A.C. and Composite system. 25 K.V. A.C., 50 Hz System-Advantages and disadvantages. Problems associated with A.C traction system, current and voltage unbalance, production of harmonics and induction effects, comparison between A.C. and D.C. system Power Supply Arrangements-	Lectures Demonstration of equipments .Exercises ,Audio visual aids such as chalk board.
Unit – II	High Voltage Supply. Constituents of supply system substation, feeding post, feeding and sectioning arrangements, sectioning post, elementary section. Miscellaneous equipment at control posts and switching station. Major equipment at substation, transformer, circuit breaker, interrupters. Protection system for A.C. Traction.	Lectures Demonstration of equipments .Exercises ,Audio visual aids such as chalk board.
Unit – III	A.C. Electric Locomotive- Block diagram of A.C. electric locomotive Overhead equipment (O.H.E.) Pentagonal O.H.E.-catanery construction. OHE Supporting structure Current collection system, current collection gear for OHE, pole collection bow collection, pantograph collector. Air blast C.B. Tap Changer (on load) Transformer Rectifier connection Traction motor connection Smoothening reactor Desirable characteristics of traction motors Traction motors-suitability of motors for traction, D.C. Series motors, A.C. Series single phase, repulsion motor, 3-phase I.M. linear I.M. Control of D.C. traction motor, series parallel control, energy saving with series parallel starting, metadyne control, multiple unit control. Requirements of breaking systems, types of electric breaking Conditions necessary to achieve regenerative breaking, suitability of motor.	Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board.
Unit – IV	Train signaling System- of train lighting, special requirements of train lighting, methods of obtaining unidirectional polarity and constant output. Battery System. Failure of under frame generating equipment Signaling- Requirements. Track circuits. Different signaling used	Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board.
Unit - V	Traction Mechanics- Types of services Speed time curve Simplified speed time curve Average speed and schedule speed Tractive effort Power of traction motor Specific energy consumption, factors affecting specific energy consumption. Mechanics of train movement Coefficient of adhesion, factors affecting the coefficient of adhesion.	Lectures Demonstration of equipments.Exercises,Audio visual aids such as chalk board.

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Course Outcome:

After successful completion of course, Students are expected to possess an in-depth understanding and Knowledge of the concepts and principles of measurement

- General Description of Electric Traction system in India, Power Supply Arrangements, A.C. Electric Locomotive, Train
- Signalling System of train lighting, Traction Mechanics.

List of Experiments

- Draw speed current characteristic of d.c. series motor.
- Draw speed toque characteristic of d.c. series motor.
- Study of various methods for speed control of d.c.
- Study of pole and bow current collector.
- Study of pantograph current collector.
- Study of Metaldyne control system.

Text Books:-

- Utilization of Electric Power and Electric Traction BY JB GUPTA
- Power Electronics and Electric Drives for Traction Application Editor(s): Gonzalo AbadFirst published: 17 September 2016

Reference Books:

1. Electric traction a.t. doverpitmin& sons
2. Electric tractionsystemequipmentd.w. hinglepergamopress
3. Electric traction handbook.r. Books pitman & sons.
4. Modern electrictraction.h. pratappritamburai&bros.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer Design , manufacture industrial machinery or power supply, power control and management system .	Able to understand the working principles of power system Control panels.	Goal 8 (decent work and economic growth), Goal 9 (industry, innovation and infrastructure)	

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SEMESTER- 6th
Course: Diploma EE
SUBJECT: UTILIZATION OF ELECTRICAL POWER

Subject Code: 2TDEE602
Theory Max. Marks: 50
Theory Min. Marks:17

COURSE OBJECTIVES:-

- The objective of the course is to operate and maintain main electrical utilities for their efficient operations.
- To make them understand concepts of utilization of Electrical Energy

	UNIT WISE COURSE CONTENTS	METHODOLOGY ADOPTED
UNIT-I	**Principles of Selection of Electrical Drive System** Requirements of mechanical load, Review of the electrical motor operation Duty cycle Principles of selection of motor ,Power transmission system Procedure to select the motor i.e. type, size & rating ,Procedure to operate & control the motor i.e. starting running braking, speed, load fluctuation	Lectures Demonstration of equipments.
UNIT –II	**Electric Heating System** Principal, Advantages and Disadvantages of electric heating system ?Modes of transfer of heat ?Principle of the resistance, induction and dielectric heating ?Principle of heat conversion in resistance, induction, dielectric heating ?Types of Furnaces – Arc and Induction Furnaces	Lectures
UNIT –III	Electric Welding System Concepts of the resistance, induction, arc metallic & carbon welding. Principles of welding Principle of TIG and MIG welding ?AC and DC Arc Welding	Lectures Demonstration of equipments. Exercises
UNIT –IV	Illumination Electromagnetic Wave spectrum ?Law of illumination ?Definitions of terms used lighting ?Types of lighting scheme and their calculation Types of lamps and their uses and fittings	Lectures Demonstration of equipments. Exercises
UNIT –V	**Power factor improvement** Causes & ill effects of low power factor ?Methods of improvement of power factor & its economics	Lectures

COURSE OUTCOME:-

- At the closing stage of the course, the students will be able to maintain electric drives used in industries, also identify a heating/welding scheme for a given application.
- To figure-out the different schemes of traction schemes and its main components and identify the job/higher education/research opportunities in Electric Utilization industry.

List of experiments;-

- Visit to the medium size manufacturing industry and observe the drive, arrangement, instrumentation & control system, procedures, instrumentation, tools, machines & sequencing of operation.

- Write report. Draw the plant layout. State the principles of the operation and control of the manufacturing system.

- Select the heating procedure for the study.
- Select welding process, either visit or video demonstration.

- Visit to the railway maintenance section and report of operation, control, switchgear and protection and maintenance of locomotive and other traction equipment, power supply, return supply and wiring system.

References book:

- Electrical Power (Gupta J. B.;. Kat aria & Sons Pub. New Delhi)
- Utilization of electrical energy & Electric Traction (Gupta J. B.;.Katson Pub. New Delhi)
- A Course in Electrical power(Soni, M.L. et al; Dhanpat Rai & Sons, New Delhi)
- Generation, Distribution & utilization of electrical energy(Wadhwa, C.L./ Wiley Eastern Ltd., New Delhi)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Junior Engineer, WeldorDesign and manufacture industrial machinerylike electric furnace heating tools welding tools etc.	Able to understand the electric circuits , electric heating, welding illumination methodology .	Goal 4 (quality education), Goal 8 (decent work and economic growth),	Start business Unit, Open shops related to electrical equipments.

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SEMESTER- 6th | **Subject Code: 2TDEE603**
Course: Diploma EE | **Theory Max. Marks: 50**
SUBJECT: ELECTRICAL INSTALLATION MAINTENANCE AND TESTING | **Theory Min. Marks**: 17

COURSE OBJECTIVES: To gain knowledge of testing, installation and maintenance of electrical appliances, their trouble shooting and electrical safety.

Unit Wise Course Contents		Methodology Adopted
UNIT-I	**Installation** Types of heavy Electrical equipment, unloading accessories precautions for unloading, installation of small and large machines of both static and rotating type. Installation of pole mounted transformer.	ICT Based & green board based class room teaching
UNIT –II	**Commissioning** Tests required before commissioning procedure to be adopted for commissioning the electrical equipment in respect of: Mechanical fixture and alignment, Electrical tests, type test ,factory test.	ICT Based & green board based class room teaching
UNIT –III	**Earthing** Reasons of Earthing, earthing system earth lead and its size, Permissible earth resistance for different installations, improvement of earth resistance, double earthing, earth resistance measurement.	ICT Based & green board based class room teaching
UNIT –IV	**Insulation testing and maintenance** Instruments used for measuring insulation resistance,Reasons for deterioration of insulation resistance, Improving insulation resistance, Drying insulation, Measurement of internal temperature of winding ,Vacuum impregnation/ filtering of insulating oil,Testing of insulating oil.	ICT Based & green board based class room teaching
UNIT –V	**Preventive maintenance & Trouble Shooting** Concepts of preventive maintenance, Advantages preventive maintenance schedule for transformer induction motor. **Trouble Shooting:** Normal performance of equipment, trouble shooting internal and external faults, instruments and accessories for trouble shooting, trouble shooting charts. **Hot Line Maintenance &electrical Accident, Safety** measures	ICT Based & green board based class room teaching

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	Meaning and advantages, Special type of non-conducting material used for preparing tools, Tools for hot line maintenance. Electrical accidents, safety regulation, treatment of shock, fire extinguishers	

COURSE OUTCOMES:-

- At the closing stage of the course, the students will be able to know the installation, commissioning and maintenance of different electrical components.
- They will be able to understand concepts of commissioning, maintenance, electrical safety, installation and maintenance of domestic appliances

References book:

- Electrical Installation work (T.G. Francis/ E.L.B.S.
- Electrical Installations Maintenance & fault location workbook.(T.T.T.I. (W.R.) Bhopal
- Operation and maintenance of Electrical Equipments(BVS Rao/ Asia Publishing or Media Promoter Publishers Pvt. Bombay)
- Electrical Maintenance & Repairs(P.P. Gipta/ Dhanpat Rai & Cons Publications)
- Estimating Commissioning and maintenance of Electrical equipment (S. Rao/ Khanna Publications
- Fundamentals of maintenance of Electrical Equipment (Bhatia/ Khanna Publications).

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Maintenance Engineer, Testing Engineer, Commissioning Engineer Job opportunities in any electrical power plant or transmission sector .Also have a job opportunities in maintenance sector	Good knowledge of installation, maintenance ,commissioning ,testing of electrical equipment	Goal 4 (quality education), Goal 9 (industry, innovation and infrastructure)	Can start own maintenance business or installation business

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th
Course: Diploma EE
SUBJECT: PROJECT

Subject Code: 2TDEE604
Theory Max. Marks: 100
Theory Min. Marks 50

References / Sources For Guidance to Student For Selection of Project Work:

- Electrical & Electronics Magazines & Journals.
- District Industries Center.
- Industry-Institution Interaction (III)
- Small Scale industry
- Industrial problems discussed during industry visit/training.
- Entrepreneurship development Board Magazine.
- "Prime Minister RojgarYojana" projects from district Collectorate.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Design engineer in various electrical companies.	Able to understand the Protection design and its requirement	4,QUALITY EDUCATION , 8 DECENT WORK AND ECONOMIC GROWTH, 9 (INDUSTRY AND INFRASTRUCTURE	Start business for consultancy.

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SEMESTER- 6th **Subject Code: 2TDEE605**
Course: Diploma EE
SUBJECT: PROFESSIONAL ACTIVITY

COURSE OBJECTIVE:

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

As the student has to practice this course in all the six semesters, the guidelines Given therein are common and applicable to each semester.

Course Objectives:

- To allow for professional development of students as per the demand of engineering profession.
- To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
- TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
- To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
- To provide time for organization of technical quiz or group discussion or any other group activity.
- To provide time for visiting library or using Internet.
- To provide time for group discussion or solving case studies.
- To provide time for personality development of students.
- To provide time for working for social cause like awareness for environmentaland ecology etc.

Detailed Instructions to Conduct Professional Activities

A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.

B. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).

C. Following grade scale of evaluation of performance in PA has been Established.

Grades	Level of performance
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.

E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programmer of study.

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G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.

H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.

I. Compendium shall contain following:
I. Record of written quiz.
II. Report/write up of seminar presented
III. Abstract of the guest lecturers arranged in the Institution.
IV. Topic and outcome of the group discussion held.
V. Report on the problems solved through case studies.
VI. Report on social awareness camps(organized for social and environmental prevention).
VII. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content. These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development. Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.

Job opportunity	**Employability skill developed**	**Local/National/UNDP Goal Achieved**	**Entrepreneurship Opportunity**
Junior Engineer Design , manufacture industrial machinery or power supply, power control and management system .	Able to understand the engineering profession .	Goal 8 (decent work and economic growth), Goal 9 (industry, innovation and infrastructure)	

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