

DIPLOMA IN ENGINEERING

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

COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER 1st

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													
2TDDE 101	Basic Science	Mathematics-I	100	50	17	20	07	30	15	2	1	0	3
2TDDE 102	Professional Core	Applied Mechanics	100	50	17	20	07	30	15	2	1	0	3
2TDDE 103	Basic Science	Physics	100	50	17	20	07	30	15	2	1	0	3
2TDDE 104	Mandatory Course	Environment engineering & safety	100	50	17	20	07	30	15	2	1	0	3
2TDDE 105	Humanities	Communication Skills-I	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDDE 102	Professional Core	Applied Mechanics	50	25	12			25	12	-	-	1	1
2TDDE 103	Basic Science	Physics	50	25	12			25	12	-	-	1	1
2TDDE 105	Humanities	Communication Skills-I	50	25	12			25	12	-	-	1	1
Total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER IInd

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allocated 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													
2TDDE 201	Basic Science	Mathematics-II	100	50	17	20	07	30	15	2	1	0	3
2TDDE 202	Professional Core	Engineering Graphics	100	50	17	20	07	30	15	2	1	0	3
2TDDE 203	Basic Science	Chemistry	100	50	17	20	07	30	15	2	1	0	3
2TDDE 204	Basic Science	Fundamentals Computer & IT	100	50	17	20	07	30	15	2	1	0	3
2TDDE 205	Humanities	Communication Skills - II	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDDE 203	Basic Science	Chemistry	50	25	12			25	12			1	1
2TDDE 204	Engg. Science Course	Fundamental Computer & IT	50	25	12			25	12			1	1
2TDDE 206	Engg. Science Course	Workshop Practice	50	25	12			25	12			1	1
Total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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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	Electrical Drawing	100	50	17	20	07	30	15	2	1	0	3
2TDEE302	Professional Core	Elements of Electrical Engineering	100	50	17	20	07	30	15	2	1	0	3
2TDEE303	Professional Core	Renewable Energy sources	100	50	17	20	07	30	15	2	1	0	3
2TDEX304	Professional Core	Electrical & Electronics Measurement and Measuring Instruments	100	50	17	20	07	30	15	2	1	0	3
2TDEX305	Professional Core	Electrical Machine -1	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDEE302	Professional Core	Elements of Electrical Engineering	50	25	12			25	12			1	1
2TDEX304	Professional Core	Electrical & Electronics Measurement and Measuring Instruments	50	25	12			25	12			1	1
2TDEX305	Professional Core	Electrical Machine -1	50	25	12			25	12			1	1
Total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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

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													
2TDEX401	Professional Core	Electrical Machine- II	100	50	17	20	07	30	15	2	1	0	3
2TDEE402	Professional Core	INDUSTRIAL MANAGEMENT	100	50	17	20	07	30	15	2	1	0	3
2TDEE403	Professional Core	Basic Electronics	100	50	17	20	07	30	15	2	1	0	3
2TDEX404	Professional Core	Generation, Transmission & Distribution	100	50	17	20	07	30	15	2	1	0	3
2TDEX405	Management Course	Entrepreneurship	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDEX401	Professional Core	Electrical Machine- II	50	25	12			25	12	-	-	1	1
2TDEE403	Professional Core	Basic Electronics	50	25	12			25	12	-	-	1	1
2TDEX405	Management Course	Entrepreneurship	50	25	12			25	12	-	-	1	1
Grand Total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

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COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER Vth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allocated 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													
2TDEX501	Professional Core	INSTRUMENTATION	100	50	17	20	07	30	15	2	1	0	3
2TDEE502	Professional Core	Electrical Circuit	100	50	17	20	07	30	15	2	1	0	3
2TDEX503	Professional Core	SWITCH GEAR & PROTECTION	100	50	17	20	07	30	15	2	1	0	3
2TDEX504	Professional Core	UTILIZATION OF ELECTRICAL POWER	100	50	17	20	07	30	15	2	1	0	3
2TDEE505	Professional Core	ESTIMATION AND COSTING	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDEX501	Professional Core	INSTRUMENTATION	50	25	12			25	12	-	-	1	1
2TDEE502	Professional Core	Electrical Circuit	50	25	12			25	12	-	-	1	1
2TDEX504	Professional Core	UTILIZATION OF ELECTRICAL POWER	50	25	12			25	12	-	-	1	1
Grand Total			650							10	5	3	18

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

DIPLOMA IN ENGINEERING

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

COURSE STRUCTURE OF DIPLOMA IN ELECTRICAL ENGINEERING SEMESTER VIth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allocated 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													
2TDEE601	Professional Elective	Professional Elective-I	100	50	17	20	07	30	15	2	1	0	3
2TDEX602	Professional Core	ELECTRIC TRACTION	100	50	17	20	07	30	15	2	1	0	3
2TDEX603	Professional Core	ENERGY CONSERVATION & MANAGEMENT	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
2TDEX601	Professional Elective	POWER SYSTEM OPERATION AND CONTROL	50	25	12			25	12	-	-	1	1
2TDEX602	Professional Core	ELECTRIC TRACTION	50	25	12			25	12	-	-	1	1
2TDEX604	Project Work	PROJECT	200	100	50			100	50	-	-	4	4
2TDEX605	Professional Core	INDUSTRY TRAINING & SEMINAR/ INTERNSHIP	50					50	25	-	-	3	3
Grand Total			650							6	3	9	18

Professional Elective-I (TDEE-601)

2TDEE-601 (A) - POWER SYSTEM OPERATION AND CONTROL

2TDEE-601 (B) – RENEWABLE ENERGY

Minimum Passing Marks are equivalent to Grade D

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

L- Lectures T- Tutorials P- Practical

Mathematics-I

Course Code: 2TDDE 101

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-I:

- 1.1 **Permutation**
- Meaning of factorial n
 - Permutation of ' n ' dissimilar thing taken ' r ' at a time,
- 1.2 **Combination**
- Combination of n dissimilar things taken ' r ' at a time

UNIT-II:

- 2.1 **Binomial Theorem**
- Statement of the theorem for positive integer
 - General Term, Middle term, Constant term
- 2.2 **Partial Fractions**
- Define a proper-improper fraction
 - Break a fraction into partial fraction whose denominator contains Linear, Repeated linear and Non repeated quadratic factors.

UNIT-III:

- 3.1 **Determinant**
- Concept & principles of determinants
 - Properties of determinant
 - Simple examples.
- 3.2 **Complex Numbers**
- Algebra of Complex Numbers
 - Polar form

UNIT-IV:

TRIGONOMETRY :

- 4.1 Allied angles.
- 4.2 Trigonometrical ratios of sum and difference of angles, (Only statement)
- 4.3 Sum and difference of trigonometric ratios (C-D formula)
- 4.4 Multiple angles (Only double angle and half angle)
- 4.5 Properties of triangle (without proof)

UNIT-V:

MATRIX:

- 5.1 Definition of Matrix.
- 5.2 Types of Matrix.
 - Row, Column, Square, Unit, Upper and lower triangular, Symmetric & Skew Symmetric, Singular and non Singular Matrices.
- 5.3 *Adjoint* of a Matrix.
- 5.4 Inverse of a Matrix.

Course Outcome:

- Through this syllabus the diploma student will learn the basic concepts of counting principle through permutation and combination , expansion of a binomial function , breaking up a complex fraction into simpler partial fractions, trigonometric ratio and concept of matrix

Reference book:

Applied Mechanics

Course Code: 2TDDE 102

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-1 COMPOSITION AND RESOLUTION OF FORCES

- 1.1 Definition, Effect, characteristics of force.
- 1.2 System of Forces.
- 1.3 Principle of Transmissibility of Forces.
- 1.4 Concept of Resultant Force.
- 1.5 Law of-
 - Parallelogram of Forces
 - Triangle of Forces
 - Polygon of Forces
- 1.6 Determination of Resultant of two or more concurrent forces (analytically and graphically).

PARALLEL FORCES AND COUPLES

- 2.1 Classification of Parallel Forces.
- 2.2 Methods of finding resultant Force of parallel forces- analytically & graphically.
- 2.3 Position of resultant force of parallel forces.
- 2.4 Definition, Classification and characteristics of a force Couple, moment of couple.

UNIT-2 MOMENTS AND THEIR APPLICATIONS

- 3.1 Definition, Types and law of moment.
- 3.2 Varignon's Principle of moment and its applications.
- 3.3 Lever and its Applications.
- 3.4 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

- 4.1 Equilibrium of a system of concurrent forces.
- 4.2 Conditions and types of Equilibrium.
- 4.3 Lami's Theorem and its applications.

UNIT-3 CENTRE OF GRAVITY

- 5.1 Difference between Centroid and Center of Gravity (CG).
- 5.2 Centroid of standard plane figures and CG of simple solid bodies.
- 5.3 Method of finding out Centroid of composite plane laminas and cut sections.
- 5.4 Method of finding out CG of Composite solid bodies.

FRICTION

- 6.1 Concept and types of friction.
- 6.2 Limiting Friction, coefficient of friction, angle of friction, angle of repose.
- 6.3 Laws of friction (Static and Kinetic).
- 6.4 .Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane.
- 6.5 Utility / Nuisance value of friction.

UNIT-4 SIMPLE LIFTING MACHINES

- 7.1 Concept of lifting Machines.
- 7.2 Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation.
- 7.3 Reversibility of Machines and condition for self locking machine.
- 7.4 Law of Machines, Maximum mechanical advantage and maximum efficiency of machine.
- 7.5 Friction in machine (In terms of Load and effort).
- 7.6 Calculation of M. A, V.R. and efficiency of following machines
 - Simple wheel and axle
 - Differential wheel and axle
 - Single purchase crab
 - Double purchase crab
 - Simple screw jack
 - Different System of simple pulley blocks

MOTION OF A PARTICLE

- 8.1 Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration.
- 8.2 Motion under constant acceleration/ retardation (equations of motion).
- 8.3 Motion under force of gravity.
- 8.4 Concept of relative velocity.
- 8.5 Definition of projectile, velocity of projection , angle of projection, time of flight, maximum height, horizontal range and their determination.
- 8.6 Definition of angular velocity, angular acceleration and angular displacement.
- 8.7 Relation between linear and angular velocity of a particle moving in a circular path.
- 8.8 Motion of rotation under constant angular acceleration.

UNIT-5 LAWS OF MOTION

- 9.1 Newton's Laws of motion and their applications.

WORK, POWER AND ENERGY

- 10.1 Definition unit and graphical representation of work.
- 10.2 Definition and unit of power and types of engine power and efficiency of an engine.
- 10.3 Definition and concept of Impulse.
- 10.4 Definition, unit and types of energies.
- 10.5 Total energy of a body falling under gravity.

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 lamina 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 ratio 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 rope break dynamometer

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.

References Books:

Physics

Course Code: 2TDDE 103

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 pursue 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 1: UNITS & Measurement, Motion

Fundamental and derived units, Scalar and vector, Basic requirements to represent vector Symbols, abbreviation, and pronunciation 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

Unit 2: 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, strain, 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.

Unit 3: Heat Heating Effect Of Current And Thermolectricity

Heat and temperature, concept of heat as molecular motion Transmission of heat, steady 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 thermolectric power., Neutral temperature, temperature of inversion and relation between them Thermo electric thermometer and thermo couples. Numerical problems and solution

Unit 4: 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 an 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 topic.

Unit 5: 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

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.

Environmental Engineering & Safety

Course Code: 2TDDE 104

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-1 Introduction to Environment

- 1.1 THE BIOSPHERE, biotic and abiotic
- 1.2 An aquatic ecosystem
- 1.3 Types of pollution
- 1.4 Impact of human being on environment.
- 1.5 Impact of environment on human being
- 1.6 Basic approach to improve environmental qualities
- 1.7 Roll of an environmental engineer

UNIT-2 Air Pollution Sources and Effects

- 2.1 Standard definition of air pollution
- 2.2 Composition of natural air
- 2.3 Names of air pollutants
- 2.4 Classification of air pollutants, primary and secondary pollutants
- 2.5 Classification of source of air pollutants on different bases
- 2.6 Definition of different types of aerosols.
- 2.7 Effect of air pollution on: human health, material properties, vegetation.
- 2.8 Major toxic metals and their effects
- 2.9 Major environmental phenomenon e.g., acid rain, global warming, green house effect, ozone layer depletion.
- 2.10 Air quality standards
- 2.11 Brief description of air pollution laws.

UNIT-3 Meteorological Aspects of Air Pollutant Dispersion

- 3.1 Meteorological parameters influencing air pollution
- 3.2 Environmental lapse rate, temperature inversion, atmospheric stability and adiabatic loss rate.
- 3.3 Turbulence, topographical effects,
- 3.4 Plume behavior, looping, coning, fanning fumigation, lofting , trapping.

Air Pollution Control Methods and Equipments

- 4.1 Natural purification processes of air
- 4.2 Artificial purification methods of air
- 4.3 Brief description of following control equipments along with sketch e.g, gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator.
- 4.4 Brief description of following processes for the control of gaseous pollutants e. g., absorption, adsorption, condensation, combustion etc.

UNIT-4 Water Pollution Sources and Classification

- 5.1 Water resources
- 5.2 Uses of water
- 5.3 Classification of water
- 5.4 Origin, composition and characteristics of domestic waste water as well as industrial waste water
- 5.5 Biochemical oxygen demand
- 5.6 Water pollution laws and standards
- 5.7 Uses of waste water
- 5.8 Classification of waste water
- 5.9 Chemical oxygen demand

Waste water treatment method

- 6.1 basic processes of water treatment
- 6.2 Meaning of primary, secondary and tertiary treatment
- 6.3 Flow chart of a simple effluent treatment plant
- 6.4 Theory of industrial waste treatment
- 6.5 Volume reduction, neutralization and proportionin

UNIT-5 Solid Waste Management

- 7.1 Sources and classification of solid waste
- 7.2 Public health aspects
- 7.3 Disposal methods - open dumping, sanitary, land fill
- 7.4 Incineration, compositing
- 7.5 Potential methods of disposal
- 7.6 Recovery and recycling of paper, glass, metal and plastic

Noise Pollution and Control

- 8.1 Sources of noise pollution
- 8.2 Units of Noise pollution measurement
- 8.3 Allowable limits for different areas
- 8.4 Problems of noise pollution and measures to control it

8.5 Noise pollution control devices brief discussion

Course Code: 2TDDE 104

Safety Practices

- 9.1 Responsibility of employees and employers regarding health and safety
- 9.2 Fire hazards prevention and precautions
- 9.3 Industrial hazards prevention and protection
- 9.4 Protection from air and noise pollution

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, SO₂ with high volume sampler.
2. Monitoring of stack gases and determination of SPM, CO, Nox, SO₂ 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 alkalinity/ 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 the use of conventional energy sources.
- Take care of issues related to Conservation & Hazard Management while working 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.

Communication Skill-I

Course Code: 2TDDE 105

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:

Unit1

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 andpresent progressive

Unit 2

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

Unit3

Comprehension of unseen passage short answer type questions to test understanding of the passage

Unit 4

précis –writing -Introductory Remarks

- Method of procedure
- Summing up

Unit 5

Essay-writing -- Introductory Remarks

- Characteristics of a good Essay
- Classifications of Essays
- Method of collecting materials

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 and extrapolate from the complex texts that are at the heart of the diver’s traditions of the English language.

Reference Books:

Course Code: 2TDDE 201

Mathematics-II

Course Code: 2TDDE 201

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-I: CO-ORDINATE GEOMETRY

- 1.1 Co-ordinate System: Cartesian and Polar.
- 1.2 Distance, Division, .Area of a triangle.
- 1.3 Locus of a point and its equation.
- 1.4 Slope of St. Line: Angle between two Straight lines, Parallel and perpendicular Straight lines.
- 1.5 Standard and general equation of Straight line. Point of intersection of two straight lines .

UNIT-II STATISTICS

- 2.1 Measures of Central tendency (Mean, Mode, Median)
- 2.2 Measures of Dispersion (Mean deviation, standard deviation)

UNIT-III DIFFERENTIAL CALCULUS

- 3.1 Define constant, variable, function.
- 3.2 Value of the function
- 3.3 Concept of limit of a function.
- 3.4 Definition and concept of differential coefficient as a limit.
- 3.5 Standard results.
- 3.6 Derivatives of sum, difference, product, quotient of two functions.
- 3.7 Differential co-efficient of function of a function.
- 3.8 Differential co-efficient of implicit function.
- 3.9 Logarithmic Differentiation.
- 3.10 Differential coefficient of Parametric function.

UNIT-IV INTEGRAL CALCULUS

- 4.1 Definition as a inverse process of differentiation
- 4.2 Standard Results (including inverse function)
- 4.3 Methods of Integration
 - Substitution
 - Integration by parts
 - Breaking up into partial fraction
- 4.4 Concept of Definite Integral

UNIT-V VECTOR ALGEBRA

- 5.1 Concept of Vector and Scalar Quantities.
- 5.2 Different types of vectors.
- 5.3 Addition and subtraction of vectors.
- 5.4 Components of a vector
- 5.5 Multiplication of two vectors
 - Scalar Product
 - Vector Product
 - Applications (Work done, power & reactive power)

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.

Reference Book:

Course Code: 2TDDE 202

Engineering Graphics

Course Code: 2TDDE 202

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-1

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.

Course Code: 2TDDE 202

UNIT-2

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, 3pin5 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

UNIT-3

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 Andleader 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)
- 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 Involute of circle and polygon
- Construction of Archimedean Spiral of any number of convolutions

UNIT-4 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

THEORY 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-
 1. Parallel to HP and VP both.
 2. Perpendicular to one plane and parallel to other.
 3. Inclined to one plane and parallel to other.
 4. Knowledge of projection of line inclined to both the planes
(No practice required)
- 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

UNIT-5

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 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.

Reference Books:

Chemistry

Course Code: 2TDDE 203

Course Objective:

- The objective of the Chemistry in poly technique 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-1 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 lyophilic 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.

UNIT-2 COLLIGATIVE PRPERTIES

Osmosis & osmotic pressure, Relative vapour pressure and Raoult's law. Internal energy (enthalpy) Entropy, Entropy 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.

UNIT-3 METALS AND ALLOYS:

Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel. General principle of metallurgy, minerals/ ores, ore dressing, roasting, smelting, base metal, 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:

Arrhenius 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 affecting 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-4 HIGH POLYMERS, RUBBER AND INSULATORS:

Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation Properties and uses of PVC, polyethylene, 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.

UNIT-5 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.

List of Experiments:

- To identify one Anion and Cation in a given sample.
- Determination of flash 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.
- Redoximetry/Titration :
 - 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.

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 water purification and its significance in industry and daily life.
- Apply the principles of green chemistry in designing alternative reaction methodologies to minimize hazards and environmental degradation.
- Understand the causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.
- Explain the properties, separation techniques of natural gas and crude oil along with potential applications and role of petrochemicals in national economy.
- Equipped with basic knowledge of polymers and its application.

Reference Books:

Fundamentals Computer & IT

Course Code: 2TDDE 204

Course Objectives:

- 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.

Syllabus:

Unit 1: 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

Unit 2: 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 & their types. Direct access Storage–

Hard Disk, Disk Cartridges, Mass Storage Device Optical Disk , CD Rom, DVD, flash drive, ZIP drive

Course Code: 2TDDE 204

Unit 3: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. 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

Unit 4: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

Unit 5: Internet Applications:

Introduction to internet, different services of internet- www, E-Mail, Chat (Textual/Voice), website access and information search, Browsers And Search Engines

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, Find Insert, modify table.
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 Code: 2TDDE 204

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.

References Books:

Communication Skills-II

Course Code: 2TDDE 205

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 correctly on 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 I- Nature ,process and importance of communication

- Meaning of communication
- Definition of communication
- Functions and importance of communication
- Process of communication

Unit II- Detailed study of the stories from the prescribed book

- Writing summary, moral and characterization of any one story from the book prescribed

Unit III – Letter writing

- Importance of letter writing
- Lay out of business letter
- Format of business letter
- Letters of complaint /claim

Unit IV- Passages of comprehension

- Steps for effective Reading
- Meaning of comprehension

Unit V-Composition and Translation

- writing paragraphs of 150 words on topics of general interest
- Translation (Hindi to English and viceversa)

Course outcome:

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

Reference Books:

Electrical Drawing

Course Code: 2TDEE- 301

Course objective:

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

Syllabus:

Chapter: 1 Symbol and Codes

ISI Symbols in electrical engineering, conventions for circuit and schematic representation of electrical and electronic components, instruments and equipment

Chapter: 2 Domestic Wiring

All types of light circuit, Fluorescent tube & fan circuit wiring , Intermediate switch circuit,

Chapter: 3 Electrical Machines

Constructional Features of Electrical Machines, Parts of a transformer, D.C. machines, alternators, induction motors, development diagram of windings of D.C. and A.C. machines, AC & DC Motor starter.

Chapter: 4 Instrument circuit

Connection of all types of meters (PMMC, Moving Iron, dynamo meter, Induction type),
Power System- Transmission line structure, Bushings, insulators, Substation drawing. Plate & Pipe earthing.

Chapter: 5 Cable

Cross-section of Cables, Power cable laying, cable joints

Course Outcome:

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

Reference Books:

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

Elements of Electrical Engineering
Course Code: 2TDEE- 302

Course Objective:

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

Syllabus:

UNIT I: Basic Concepts of Electrical Engineering

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.

UNIT II: Electrical Materials

Conducting materials & properties. Insulating materials & properties. Magnetic materials & properties. Semi Conduction materials & properties.

UNIT III: Capacitors

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 numerical), A.C. /D.C. capacitors and applications.

UNIT IV: Inductors

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

UNIT V: Magnetic Circuits

Concept of magnetic flux. Concept of electromagnetism. (Magneto motive force, Magnetic field strength, Permeability. Reluctance.), Magnetic leakage, leakage coefficient. , Magnetic circuits, Series & parallel circuits, Comparison of electric & magnetic circuits.

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

PRACTICAL EXPERIENCES

1. Electrical engineering laboratory practices
 - i. Supply system & safety.
2. Introduction to various measuring instruments.
3. Difference between EMF, terminal voltage & voltage drop in practice.
4. Application of rheostat as Regulator.
5. Effect of series & parallel connection of two lamps on current, voltage, power . dissipated & energy consumed in a given circuit
6. Study of various types of capacitors.
7. Study of AC & DC voltage waveform from CRO.
8. Study & analysis of varies resistance.
9. Behaviour of fuse under normal & abnormal (overload, short circuit) operating
10. Study of charging & discharging characteristics of capacitor.

Reference Books:

1. Electronic Component by Padmanaban
2. Electronic Component by Ramachander
3. Electronic Components & Materials - LM Prepared at IIT, Delhi under Project IMPACT
4. Electrical Engineering Materials by TTTI , Madras
5. Electrical Engineering Materials by Insular and Tiruvenkadam
6. Electrical Engineering Materials by M. L . Guptha.
7. Electrical Engineering by P.L.Kapoor

Renewable Energy Sources

Course Code: TDEE- 303

Course objectives

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

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

Syllabus:

Chapter: 1 Biomass Energy

Overview of biomass as energy source, Production of biomass, Classification of biomass, Biomass conversion routes: biochemical, chemical and thermo-chemical.

Chapter: 2 Solar Energy

Solar thermal conversion, Solar radiation, Solar thermal Energy conversion: Conversion of heat into mechanical energy, Principle of photovoltaic conversion

Chapter : 3 Hydro Energy

Introduction to Hydropower, Classification of Hydropower Plants, Advantages and Disadvantages of Hydropower. Selection of site for hydroelectric plant, Hydrological cycle.

Chapter : 4 Wind Energy

Basic Principles of Wind Energy conversion Site Selection criterion, wind data & energy estimation ,Environmental benefits and problems of wind energy, Economics of wind energy.

Chapter : 5 New Energy Resources

Need of energy systems and materials, Hydrogen Energy, Fuel Cell, Ocean Energy, Geothermal Energy, Magneto-hydro-dynamic (MHD) energy conversion.

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.

References book:

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

Electrical and Electronics Measurements and Measuring Instruments

Course Code: 2TDEX- 304

Course Objective:

- 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.

Syllabus:

Unit 1:

Classification of measuring instruments, Indicating, recording and integrating types of meters. Errors and types of errors, accuracy, precision and sensitivity. Electrical measuring instruments - Construction, operation. Deflecting, controlling and damping forces, supporting systems, moving coil, electro-dynamometer, moving iron and induction type instruments, simple numerical. Hot wire type instruments, vibration galvanometer, shunt and multipliers, CT & PT. Wattmeter and Energy meters – Dynamometer and induction type wattmeter, Induction type energy meters. measurement of 1-phase and 3-phase power in balanced and unbalanced load condition, 3 phase wattmeter.

Unit 2:

Measurement of resistance –

Classification of resistance, measurement of low, medium, and high resistance. Kelvin's double bridge, wheat-stone bridge, Ammeter, voltmeter method and ohmmeter, millimeter, megger. Importance of earth resistance, Earth tester.

A. C. Bridges –

Measurement of inductance and capacitance by A.C. bridges. Maxwell, Anderson, Hays, Desauty and Wien's bridge. (no pharos diagram)

Unit 3:

Additional measuring instruments – Electrical resonance, Weston and vibration reed frequency meter, dynamometer power factor meter, Weston synchroscope, Merz price maximum demand meter, Rotating type phase sequence

Indicator. Magnetic measurement – Ballistic galvanometer, measurement of flux by B.G. Gressort flux meter, determination of hysteresis loop for ring and bar specimen.

Unit 4:

Dielectric measurement. Meaning of dielectric loss, its importance, methods of measurement of dielectric loss by Wattmeter, C.R.O. Schering bridge.

Cathode Ray Oscilloscope –

CRT, Electrostatic and magnetic deflection, time base X and Y amplifiers, controls on the C.R.O. Dual beam oscilloscope. Digital storage and multi-channel CRO .

Unit 5:

Electronic Instruments -Transistor volt meter, FETVM, balanced bridge, specification of electronic voltmeter. Single and three phase electronic energy meters, mill-voltmeter and micro-volt meters. Digital instruments – Digital voltmeters- types, specifications. Digital millimeters. Counter / timers. Universal indicators for voltage, current, frequency, power, power factor, temperature, humidity etc. Digital tachometers (Contact & non Contact type). Digital controllers.

Course Outcome:

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope
- Ability to use Digital voltmeters 7. Ability to measure strain, displacement, Velocity, Angular Velocity, temperature, Pressure ,Vacuum, and Flow

List of Experiments:

- Measurement of low resistance by Kelvinn Double bridge.
- Measurement of medium resistance by wheat stone bridge.
- Measurement of insulation resistance by Megger.
- Measurement of inductance by Maxwell's bridge.
- Calibration of Voltmeter, Ammeter, Wattmeter, Energy meter.
- Measurement of P.F. by ammeter, voltmeter and wattmeter method.
- Plot B.H. curve by method of reversal using B.G.
- Use of CRO for measurement of voltage, current, phase and frequencies.
- Measurement of 3-phase power by two wattmeter method.
- Study and use of digital instruments, e.g. digital multi meter, frequency meter, electronic timers and counters.

Text Book:

1. Golding E.W. & Wides F.C. : Electrical Measuring Instruments & Measurements ; Wheeler
2. Electronic Instrumentation – H.S. Kalsi, ISTE/EXCEL BOOKS
- 3 Singh:Industrial Instrumentation &control 2/e Tata Mcgraw-Hill,NewDel
- 4 Sawhney A K : A course in Electrical & Electronic Measurements & Instruments, Dhanpat rrai
- 5 Kalsi:Electronic Instrumentation TMH

1. Reference Books:

2. Electrical and Electronics measurement- A. K. Savahny.
3. Electrical instrumentation- PankajSwarnakar

Electrical Machine-I

Course Code: 2TDEX- 305

Course Objective:

- 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.

Syllabus:

Unit 1:

Energy Conversion Principle - Law of conservation of energy, electromechanical energy conversion classification of machines.

Unit 2:

D. C. Generator - Principle, construction, armature winding, types of winding, EMF equation, armature reaction and commutation, interlopes and compensating winding. Types of generators, characteristics and applications, losses and efficiency. Simple numerical.

Unit 3:

D. C. Motors - Principle, production of back EMF, torque equation. Classification, characteristics and applications of motors. D. C. motor starters speed control, losses and efficiency. Brake test, Swinburne test. Simple numerical.

Unit 4:

Single phase transformers - Principle, construction, classification. EMF equation, turns ratio, name plate rating, pharos diagram, no load and on load equivalent circuit. Voltage regulation, polarity ratio, open and short circuit tests, losses and efficiency, condition of maximum efficiency. All day efficiency and its numerical. Auto transformer. Parallel operation of single phase transformer.

Unit 5:

Three phase transformer - Connections, groups, Scott and open delta connection. Comparison of three phase transformer with bank of three single phase transformers. Parallel operation.

Course Outcome:

Student after successful completion of course must possess an understanding of

- D. C. Generator, D. C. Motors
- Single phase transformers
- Three phase transformer, And all off the above motors advantages ,disadvantages , applications and all machine test.

List of Experiments:

- Study of D. C. Machines (Parts)
- Speed control of D. C. Motor (armature and field control method)
- Brake Test on a DC Shunt Motor.
- Brake Test on a DC Compound Motor.
- Open Circuit Characteristics of a DC Shunt Generator
- Load test on a D.C. Shunt Generator
- To perform Swinburne test of DC Motor.
- Load test on a D.C. Series Generator
- Hopkinson Test .
- Separation Of Core Losses.
- Study of transformer (Parts) (single and three phase)
- To perform polarity test of single phase transformer.
- To perform ratio test of single phase transformer.
- To perform open circuit test of single phase transformer.
- To perform short circuit test of single phase transformer.
- Parallel operation of single phase transformer..

Text Book:

1. Bhimbra P.S.: Electrical Machinery; Khanna Pub
2. Nagrath I.J. & Kothari D.P. : Electric Machines, TMH
3. Mukherjee P K & Chakraborty S : Electrical Machines ; Dhanpat Rai Pub.
4. Sen S K : Electrical Machines ; Khanna Pub.
5. Clayton A.E. & Hancock N N : Performance & Design of Direct Current Machines, CBS Pub. & Distributors;

6. Gupta: Fundamentals of Electrical Machines, New Age International

7. Course Code: 2TDEX- 305

8.

Reference Books:

1. Electrical Technology Vol. II BL TherejaKhanna publisher
2. Electrical Machines Bhattacharya T.T.T.I.
3. Electrical Machines Nagrath& Kothari PHI Electrical Machines Vol. I & II
4. PS BhimbiraKhanna Electrical Machine

Electrical Machine-II

Course Code: 2TDEX- 401

Course Objective:

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

Syllabus:

Unit 1: Three phase Induction Motor:

Production of rotating magnetic field, principle, construction and types of induction motors. Equivalent circuit, torque equation, torque-slip characteristics. Types of starters: DOL, Star-delta, Auto transformer type, rotor resistance type, contactor type starter. Speed control. No load and blocked rotor test, losses and efficiency. Braking and applications. Simple numerical.

Unit 2: Synchronous Motor:

Principle, construction, pharos diagram, effect of change in excitation curves, synchronous condenser, starting of motors, hunting and its prevention, coding of synchronous machines.

Unit 3: Synchronous generator:

Principle, construction, salient and cylindrical rotors, speed frequency relationship, EMF equation, distribution and pitch factor, equivalent circuit, synchronous impedance, regulation, O.C.C. and S.S.C., load characteristics, pharos diagram, parallel operation. Methods of synchronization, power-angle characteristics.

Unit 4: Single-Phase Induction Motors:

Principle, double revolving field theory. Types of motors with the ir construction, characteristics and applications. Comparison of three phase with single phase induction motors.

Unit 5: AC Commutator motors:

Introduction, series motor, compensated series motor, commutating poles, universal motor, repulsion motor. Special purpose machines-Induction motor, stepper motor, PM motor.

Course Outcome:

- To impart the knowledge on fundamental of AC rotating machine
- To impart the knowledge on constructional details, principle of operation of 3 phase alternator and synchronous motor
- To impart the knowledge on constructional details, principle of operation, performance, starter, speed control and braking of 3 phase induction motor.
- To impart the knowledge on constructional details, principle of operation, type of 1 phase induction motor and special machine.

1

List of practicals:

- Study of three phase induction motor (parts).
- Load test on induction generator
- No load and Blocked rotor test on three phase induction motor to draw (i) equivalent circuit and (ii) circle diagram. Determination of performance parameters at different load conditions from (i) and (ii).
- Measurement of slip of three phase induction motor.
- Study of three phase induction motor starters.
- Load test on single phase induction motor to draw output versus torque, current, power and efficiency characteristics.
- Load test on induction generator
- Conduct suitable tests to draw the equivalent circuit of single phase induction motor and determine performance parameters.
- Study of synchronous machine (parts).
- OCC and SCC of synchronous generator and determination of regulation.
- To plot V curves of synchronous motor.
- Study of different single phase induction motors (construction).
- Conduct an experiment to draw V and Λ curves of synchronous motor at no load and load conditions
- Study of AC commutator motors (construction).
- Study of special purpose motors (construction).

Text Book:

1. ALTERNATING CURRENT MACHINES – A. Langsdorff
2. ELECTRICAL MACHINES – BHIMBRA
3. AC COMMUTATOR MOTORS – Taylor

4. FRACTIONAL HORSE POWER MOTORS – Veinott

5. **Course Code: 2TDEX- 401**

Reference Books:

1. Electrical Technology Vol.II- BL Thereja
2. Electrical Machines Bhattacharya
3. Electrical Machines Vol.I& II P S Bhimbra

Industrial Management

Course Code: 2TDEE- 402

Course objective:

1. 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.
2. 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.
3. 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.
4. They will be involved in application exercises and case studies which will assist them to develop graduate attributes.

CHAPTER -1MANAGEMENT& 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.

CHAPTER -2MATERIALS 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.

CHAPTER -3PRODUCTION 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.

CHAPTER- 4INDUSTRIAL 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.

CHAPTER -5 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.

Course Outcome:-

1. Students will be able to perform the Management Functions.

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

References book:

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

Basic Electronics

Course Code: 2TDEE- 403

Course Objective:

1. To make the students to identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as pn junction diode, characteristics and ammeters, DC load line, Zener diode.
2. To make the students to draw and explain the structure of bipolar junction transistor.
3. To make the students able to describe the application of transistors for Current and voltage amplification. Also to describe the characteristics of different configurations of the transistor.

Syllabus:

Chapter – 1 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.

Chapter – 2 Rectifiers

Half wave rectifiers. □ Full wave rectifiers (Center-tap & Bridge). □ Ripple factor, PIV, rectification efficiency, comparison, merits and demerits of different types of rectifier.

Chapter – 3 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.

Chapter – 4 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.

Chapter – 5 Filters Filter circuits for power supply: Inductor filter, Capacitor filter, LC filter, Multiple LC filter, CLC or π Filter, introduction of MOSFET and IGBT.

PRACTICAL EXPERIENCES

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

Course Outcomes:

After completing syllabus student will be able to:

1. Identify and explain the working principles of various semiconductor devices, relate their characteristics and applications
2. Explain the characteristics of CB, CE and CC configuration circuits.
3. Identify and explain the working of transistors in various configurations.
4. Explain operation and function of large and small signal amplifiers with applications.
5. Make simple power supplies and amplifiers and test related circuits.

References book:

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

Generation Transmission and Distribution

Course Code: 2TDEX- 404

Course Objective:

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

Syllabus:

Unit 1:

Non Conventional Sources Of Energy: Concept and need of primary and secondary energy sources, difference between conventional and nonconventional sources of energy, concept of solar, wind, bio gas, ocean, tidal, geothermal, fuel cell, MHD and their practical applications. Conventional Sources Of Energy : Detailed study of generating stations- thermal, hydro, nuclear, schematic diagram, site selection main components and auxiliaries for above power stations. Study of gas turbine plant and diesel power plant. Advantages, disadvantages of thermal hydro, nuclear, gas turbine plant and diesel power plant.

Unit 2:

Concept Of Load: Types of load, load curve, load duration curve, connected load, demand factor, average load, maximum demand, load factor, diversity factor, plant utilization factor, capacity factor, reserve capacity. Simple numerical on above terms. Types of Tariff, flat rate, block rate, two part, maximum demand and power factor tariff. Their merits and demerits. Simple problems and above terms.

Unit 3:

Concept of Transmission, single line diagram of complete power system, standard voltages of A.C. Transmission, efficiency (no derivation). H.V.D.C. transmission system, line diagram, advantages and Disadvantages of H.V.D.C Sag, causes & effects of sag on transmission line, effect of wind, ice and temperature on sag. Types of line supports, type of joints, lumps, earth wires, ground wire and vibration dampers. Importance of R, L, C in transmission line (no derivation), skin effect, transposition, corona, advantages and disadvantages of corona, methods of reducing corona, type of insulators, string efficiency and voltage distribution, grading ring and Arcing horn.

Unit 4:

Types of Transmission line, T and Π network of medium Transmission line, transmission efficiency, Ferranti effect, simple problems of short and medium Transmission line. Difference between overhead

line and underground cables. Classification and construction of L.T. and H.T. cables, Method of laying.

Unit 5:

Classification of distribution system, ring main, radial and inter connected system. Concept of feeder, distributor and service mains in distribution system. Simple problems.

Course Code: 2TDEX- 404

Course Outcome:

- Students will be able to learn the basics of various fundamentals of electrical power generation, transmission & distribution.
- Students will be able to learn transmission line parameters, their calculations also the effects on transmission lines & its effects on the communication system.
- Students will be able to learn electrical characteristics of transmission line such as types of transmission lines, various effects on transmission & per unit representation of power system.
- Students will be able to learn load flow studies and its equation, Comparison of various methods like GS & NR
- Students will be able to learn Mechanical design along with the types of insulators also the knowledge of voltage distribution across the string and introduction to HV, LV and EHV.
- Students will be able to learn information regarding conductors and insulation, different types of underground cable parameters

- Reference Books:
- (1) Non Conventional energy sources By G. D. Rai, Khanna publisher
 - (2) Electrical Power By S. L. Uppal, Khanna publisher
 - (3) Electrical Power By J. B. Gupta
 - (4) Power System By V. K. Mehta

List of Practical

- Study of solar cooker.
- Study of solar water heater.
- Study of solar photo-voltaic cells.
- Study of wind mill.
- Study of Bio Gas plant.
- Study of steam power plant, hydro power plant, nuclear power plant.
- Study of line supports and insulators.
- Determination of string efficiency of insulator string.

Text Book:

1. Kirchmayer, L K - Economic Operation of Power Systems - John Wiley, New York
2. Nagrath, I J & Kothari, D P - Modern Power System Analysis - Tata McGraw Hill
3. Elgerd O L - Electric Energy System Theory - McGraw Hill

Reference Books:

- 1 Non Conventional energy sources By G. D. Rai, Khanna publisher
- 2 Electrical Power By S. L. Uppal, Khanna publisher
- 3 Electrical Power By J. B. Gupta
- 4 Power Systems By V. K. Mehta

Course Code: 2TDEX- 405

Entrepreneurship

Course Code: 2TDEX- 405

Course Objects:

Entrepreneurship education is a kind of education that aims at cultivating the comprehensive qualities of entrepreneurship, the value of innovatory spirit and entrepreneurship abilities. The objectives of entrepreneurship education in university are in the following four aspects.

- Cultivating the spirit of entrepreneurship
- Leadership
- Teamwork
- Bearing a part of quality-oriented education

Managing relationships

Syllabus:

Unit 1:

Introduction to Entrepreneurship; Definition of Entrepreneur/ Entrepreneur, Difference between , Entrepreneurship/ Entrepreneurship, Need for Entrepreneurship, Qualities of successful entrepreneur Myths about Entrepreneurship, Classification of entrepreneurs on the basis of different criteria, Reasons for the failure of entrepreneurs

Unit 2:

Industries and Business Organization; Concept of Industry or Enterprise, Classification of Industries : (a) On the basis of capital investment; Tiny(Micro)Industry, Small Scale, Medium Scale, Large Scale, (b) Others; Rural Industry, Cottage Industry, (c) Forms of Business Organization; Proprietorship, Board & Co-operative, Partnership, Public Ltd., Private Ltd., Jt. Sector, Government Co-operative/Undertakings , (d) Tiny small scale Industry; Definition, Its significance in National Development, Govt. policies for SSI promotions Sector /Product for SSI.

Unit 3:

Institutional Assistance; (a) Types of Institutional assistance: Infra-structural assistance, Technical Assistance, Financial assistance, Marketing Assistance, (b) Information/guidance & Training : SISI,-ASK, MPCON, CSIR, CED-MAP, NRDC, (c) Infrastructure: D/C, AVN/AKVN, (d) Finance: SIDBI- KVIB, MPFC, NABARD, MPWDC, NSICM.P.A.V.V.N.,(e) Marketing: MP-AGRO, NSIC, PM.LUN, EXPORTCOPPORATION, KVIP, MPHSVN, MPLDC, (f)Quality Control : BIS, FPO, MPLUN, F.D.A., AG.MKT. Board.Incentives/Concession/ Facilities Available: Seed money, Incentive/subsidies others

(Phones, Land set c)

Course Code: 2TDEX- 405

Unit 4:

Planning of Industrial Unit: Pre-Planning Stage; Scanning the environment, Market survey, Seeking information, product/project selection, Implementation Stage; PPR Preparation, DIC registration, Arrangement of Land, Arrangement of Power, Obtaining NOC/ Licenses from various Deptt., DPR Preparation, Seeking financial assistance, Commercial Production, Post Implementation stage; Permanent registration from D.I.C., Availing Subsidies, Diversification/Modification, Setting up of marketing channel/Distribution.

Unit 5:

Achievement Motivation; Historical perspective, Concept of achievement motivation, Significance of achievement motivation, Development of achievement motivation, Financial Management of an Industrial Unit(SSU); Tools of financial analysis, Ratio analysis, Fund Flow/Cash flow analysis, Working capital and Concepts Financial accounting

Course Outcome:

- Entrepreneurial behaviour, attitudes and skill development
- Creating empathy with the entrepreneurial life world
- Key entrepreneurial values
- Motivation and entrepreneurship career
- Understanding of process of business entry and tasks
- Generic entrepreneurship competences
- Key minimum business how-to

Text Book:

1. Entrepreneurial Development by Khanka S.S.
2. Entrepreneurship Simplified: From Idea to IPO by Ashok Soota and S.R. Gopalan

Reference Books:

1. Entrepreneurial Development Vol.I,II,III by Vasant Desai Himalaya Publication
2. CEDMAP (Center of Entrepreneurial development Madhya Pradesh)

Instrumentation

Course Code: 2TDEX- 501

Course Objective:

- Adequate knowledge in measurement techniques for voltage, current, power and energy.
- To introduce students to monitor, analyze and control any physical system.
- To understand students how different types of meters work and their construction
- To provide a student a knowledge to design and create novel products and solutions for real life problems.

Syllabus:

Unit 1: Measuring System-

Elements of a measuring system, Block diagram of system configuration, performance, standards, time lag, error, distortion and distortion meters, noise and noise factor. **Transducers**-Transducers definition and classification, mechanical devices as primary detectors, Characteristic & choice of Transducers, Electrical transducers, Advantages of electric transducers, Active and passive transducers, Classification, Resistive, inductive and capacitive transducers, Potentiometric, Metallic and semiconductor strain gauges, Gauge factor, types, material used and applications. Thermistor, RTD, Inductive, LVDT, RVDT and Capacitive transducers and their application. Thermocouples, Piezo-Electric transducers, principle, materials used, mode of operation and application. Frequency generating transducers. Hall Effect transducers, Optoelectronic transducers such as photo voltaic, Photo conductive, and photo conductive cells, constructional details, characteristics and applications. Photo diodes and transistors, characteristics and applications. Digital transducers, Optical encoders for linear and angular displacement measurement.

Unit 2: Signal Conditioners

Purpose of signal conditioning, Classification, Input modifier, Operational amplifiers circuits used in instrumentation, D.C. amplifier, and chopper amplifier. Instrumentation amplifier, characteristics, three amplifier configuration. A/D and D/A converters.

Measurement of Physical Quantities: Measurement of Pressure-Types of pressure measurement devices, Force summing devices, Secondary transducers, Low pressure measurement, Pirani gauge and thermocouple gauge. Resistive, Inductive and Capacitive pressure measuring devices. Measurement of speed: Measurement of speed by stroboscope, photoelectric and reluctance pick-up devices for speed measurement.

Unit 3: Measurement of Vibration-

Necessity for Vibration Measurement, Seismic Transducer, Piezo electric and LVDT Accelerometers. Measurement of Temperature-Temperature measuring devices, Resistance thermometers, Radiation and Optical Pyrometers. Measurement of Flow-Turbine and electromagnetic flow meters, Ultrasonic flow meter, Thermal flow meters. Measurement of Humidity-Humidity, absolute and relative humidity, Resistive and Capacitive hygrometers. Measurement of pH Value-Concept, pH scale, pH cell, pH meter. Measurement of Thermal Conductivity (gas analyzer). Measurement of level: Float and potentiometer

method of flow measurement, Resistive and Capacitive methods, Ultrasonic and Gamma rays methods. Measurement of Force and Torque- Electronic weighing system, Hydraulic load cell. Torque measurement, concept, Stress and Deflection type torque measurement methods.

Course Code: 2TDEX- 501

Unit 4: Necessity, Principle,

classification, current and voltage telemetry, Position telemetry, synchros. Frequency and pulse telemetry, Principle of frequency and pulse modulation, PAM, PPM and PCM. Idea about landline and R.F. telemetry and multiplexing. Pulse code format, Modulation techniques of digital data transmission, Digital multiplexers.

Data Acquisition System-Introduction data acquisition system, generalized DAS, Single and multi channel DAS, Data loggers, Special encoders.

Unit 5: Display Devices and Recorders:

Digital display system and indicators like CRT, Seven Segment LED, LED, and LCD. Analog and digital recorders, Strip and circular chart recorder and Magnetic tape recorder, X-Y recorders. Ultraviolet recorders, Frequency modulated (FM) recording. Digital tape recorders.

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 of electrical and non electrical viz. Physical quantities and instruments

- Use instruments measuring instruments according to the need of specific application.
- Calibrate and standardize the instruments.
- Design measuring instruments on requirement basis.
- To measure different parameters from the simulated instrumentation systems using virtual instrumentation.
- Measure various electrical parameters with accuracy, precision, resolution.
- Use AC and DC bridges for relevant parameter

List of Experiments:

- Measurement of Distortion using wave distortion meter.
- Measurement of load/weight using strain gauge and cantilever.
- Measurement of linear displacement by LVDT and draw its characteristics.
- Measurement of temperature by-(a) Thermocouple (b) Resistance Thermometer
- Measurement of pressure using LVDT and diaphragm gauge.
- Study and use of data conversion using ADC and DAC.
- Measurement of pH value using pH meter.
- Measurement of Humidity by hygrometer.
- 9. Study and use of synchros in position telemetry system.
- Measurement of Vibration using piezoelectric/LVDT transducer.
- Study and flow measurement using electromagnetic flow meter.
- Study of time division and frequency division multiplexing.
- Measurement of liquid level by resistive/capacitive transducer.
- Study and measurement of temperature using optical and radiation pyrometer.
- Study of strip chart recorder and magnetic tape recorder.

Course Code: 2TDEX- 501

Text book:-

1. A.K. Sawhney; 'A course in Electrical & Electronic Measurements & Instrumentation';
Dhanpat Rai & co(p) Ltd ,New Delhi

References Books:

- 1) Electrical and Electronic Measurement and Instrumentation by A.K. Sawhney
- (2) Instrumentation Devices and Systems by C S Rangan, G R Sharma and V S V Mani
- (3) Digital Electronics By Malvino Leach
- (4) Instrumentation By Cooper

Electrical Circuit

Course Code:2TDEE- 502

Course Objective:

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

Syllabus:

Chapter: 1 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.)

Chapter: 2 NETWORK THEOREMS Superposition theorems, Thevenin's theorem, Norton's theorem, Source conversion, Maximum power transfer theorem, Star delta transformation, (Numerical on D.C.)

Chapter: 3 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.

Chapter: 4 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.

Chapter: 5 **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.

PRACTICAL EXPERIENCES

1. Observe A.C. waveforms on CRO and find various quantities like:
 - a. Amplitude.
 - b. Average value.
 - c. R.M.S. value.
 - d. Frequency.
2. Observe response of pure resistance to A.C.
3. Observe response of pure Inductance to A.C.
4. Observe response of pure capacitance to A.C.
5. Determination of current & power factor in series R-L circuit. Draw phasor diagram.
6. 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.
8. Resonance in series R-L-C circuit.
9. Verify line & phase values for star connection.
10. Verify line & phase values for delta connection.
11. Verify KVL and KCL for D.C. circuits.
12. Verify superposition theorem for D.C.
13. Verify Thevenin's theorem for D.C.
14. Verify maximum power transfer theorem for A.C. & D.C.
15. Verify Norton's theorem for DC.

Course outcomes:

1. Students will learn about the different types of electrical sources and networks
2. Students will have knowledge of converting a electrical circuit into graph and will be able to analyze the circuit graphically.
3. Student will analyse circuits with ideal, independent, and controlled voltage and current sources
4. Student will be able to find out current through or voltage across any branch of a given Electrical network using theorems.
5. Students will learn about series and parallel resonance conditions in series and parallel circuits and its impact on network voltage and current magnitudes.
6. Students will have knowledge of balanced and unbalanced poly phase circuits.
7. Students will be able to analyze the behavior of non-sinusoidal waveforms.

Text Books:-

1. Network Analysis by M.E. Van Valkenburg
2. Network ANalysis an Synthesis by B.R. Gupta

References Books:

1. Data communication and Networking by Behrouz A. Forouzan
2. Data communication by William Schweber
3. Computer Networks by Tenenbaum
4. Introduction to Digital & Data communication by Michael A. Miller
5. IBM PC and Clones by Govindrajalu
6. Electronic Communication Systems by Wayne Tomasi
7. Welcome to Internet by Tom Badgett and Corey Sandler
8. Web Based Learning Material on Computer Networking by IIT, Mumbai

Switch Gear & Protection

Course Code: 2TDEX- 503

Course Objective:

- The Primary Objective of The Course is to introduce students to power system protection and switchgear.
- To teach students theory and applications of the main components used in power system protection for electric machines, transformers, bus bars, overhead and underground feeders.
- To teach students the theory, construction, applications of main types Circuit breakers, Relays for protection of generators, transformers and protection of feeders from over- voltages and other hazards. It emphasis on neutral grounding for overall protection
- To develop an ability and skill to design the feasible protection systems needed for each main part of a power system in students.

Syllabus:

Unit 1: Introduction –

Purpose of protective system, requirement and selection. Abnormalities in a power system and their effects. Reasons for failure. Self and non self clearing faults. Use of CT/PT in protective scheme. Definition of terms regarding CT/PT. Advantages of CT/PT. Neutral earthing, their methods and advantages.

Unit 2: Circuit interruption devices –

Function of fuse. fusing factor, fusing characteristic. Application of isolator and circuit breakers. Circuit breaker capacities. Arc formation in C.B. and methods of arc extinction. Definition of various terms with reference to circuit interruption wave form. working principle and operation of Bulk Oil/Minimum oil/air blast/SF CB. Merits and Demerits of different types of C.B.

Unit 3: Protective relay –

Type of relays- induction, electromagnetic, thermal. Primary and back up relaying. Types of back up relays, causes of failure of primary relaying. Explanation of terms used in relaying. Principle and working of different types of relays- electromagnetic and induction type. Induction type over current relay, reverse power relay, time and current settings. Differential relays, distance relays, thermal relays, inverse current characteristics.

Unit 4: Protection against over voltages –

Causes and effects of over voltage. Traveling wave. Over-voltage protection, earth wire, lighting arresters- Multiple gap type, horn gap type, line type, station type and distribution type. Surge absorber.

Unit 5: Protective schemes –

Protection of alternator- various abnormalities, Merz price differential protection, over current and earth fault protection. Protection of transformer - various abnormalities, differential protection, Buchholz relay. Feeder and transmission line protection - time graded and over current protection, current graded system,

differential protection. Protection of Induction motors, use of thermal relays and under voltage protection.

Course Code: 2TDEX- 503

Course Outcome:

- After successful completion of course, Students are expected to possess an in-depth understanding and Knowledge of the theory and applications of the main components used in power system protection for electric machines,. Transformers, bus bars, overhead and underground feeders.
- Explain the working of different types of switchgear equipments like circuit breakers and relays.
- Design the ratings for fuses according to the requirement Elucidate various protection schemes of various power system components like alternators, transformers and bus-bars
- Explain various methods of over voltage protection in power systems.

Text Books:-

1. CL Wadhwa, Electrical Power systems, New age International.
2. B. Ravindran and M Chander, "Power System protection and Switchgear", New Age International

References Books:

1. B.Ravindran and M Chander, "Power System protection and Switchgear", New Age International.
2. Fundamentals of Power System protection Y.G.Paithankar & S.R. Bhide; E.E.E
3. CL Wadhwa, Electrical Power systems, New age International.
4. Haddi Saadet, "Power System Analysis, TMH
5. A.R. Bergen, Vijay Vittal, "Power System Analysis, Pearson Education, Asia.
6. Switchgear & protection Sunil S. Rao. Khanna Publication.
7. Ravindra P. Singh, Switchgear & Power System Protection, PHI Learning.
8. Badirka, Power System protection and switchgear, TMH.

Utilization of Electrical Power

Course Code: 2TDEX- 504

Course Objective:

- The Primary Objective of the Course is to Introduce Operation Principles of Electric drives, Electric heating, Electric welding, Illumination,
- Power factor improvements, Electro-chemical processes and storage batteries.

Syllabus:

Unit 1: Electric drives

Merits and demerits of electric drives, factors governing selection of motors, drive requirements. Group and individual drive, starting and running characteristics of various motors. Selection of starters, hand operated and contactor type starters, liquid resistor type starter. Speed control of motors, load equalization, use of fly wheel. Motor enclosures, selection of motors for particular service, size and rating of motors.

Unit 2: Electric heating-

Advantages and disadvantages of electric heating, methods of electric heating. Principle of electric heating. Resistance heating, heating elements and alloys. Causes of failures of heating elements. Arc furnaces, principle, construction, working and uses. Induction heating principle, construction and use of Ajax Wyatt (core type) and coreless type. L.F. and H.F. induction furnaces. Dielectric heating principles and uses.

Unit 3: Electric welding-

Definition, classification of electrical welding, principle of arc welding. Qualities of a good weld. Welding defects. Resistance welding, advantages, classification, principle and working, comparison of resistance and arc welding process, A.C. & D.C. arc welding.

Unit 4: Illumination-

Electromagnetic wave spectrum, solid and plane angle, definition of electrical terms in use, sensitivity of human eye. Luminous efficiency, horizontal and vertical laws of illumination, definition of terms used in lighting, lighting scheme, various types of lamps, their use and fittings.

Unit 5: Power factor improvements

Causes of low P.F., effects of low P.F., methods of improvement of P.F. and its economics.

Electro-chemical processes and storage batteries-Electro deposition and faraday's laws of electrolysis, various electrochemical processes like electroplating, electro-extraction, regions. Storage batteries, classification, construction. Battery maintenance, battery charging, circuit diagram. Application of storage batteries.

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 of Electric drives, Electric heating, Electric welding, Illumination.
- To the Power factor improvements, Electro-chemical processes and storage batteries

List of Practicals:

- Speed control of slip ring induction motor by variation of rotor resistance.
- To verify the change in power factor by changing load parameters and its improvement using capacitance.
- To draw 'V' curves of synchronous motor.
- Study and operation of resistance oven and to control its temperature.
- Study of dielectric / induction heating.
- Measurement of luminous efficiency of lamps by lux meter.
- Study and operation of various types of lamps.
- Study of arc welding.
- Measurement of energy using single phase energy meter
- Residential house wiring using fuse, switch, indicator, lamp and energy meter

Text Books:-

1. N N, Electric Power Utilisation, Wheeler Pub.
2. Garg, G.C., Utilization of Elect. Power and Elect.Traction

References Books:

1. Open Shaw, Taylor, .Utilization of electrical energy. Orient Longmans,1962
2. H. Pratap, Art and Science of Utilization of Electrical Energy.
3. Gupta, J.B., Utilization of Elect. Energy, Katariya and sons, New Delhi.
4. Garg, G.C., Utilization of Elect. Power and Elect.Traction.
5. N V Suryanarayan, Utilization of Elect. Power including Electric Drives and Elect. Traction, New Age International.
6. Hancock N N, Electric Power Utilisation, Wheeler Pub.
7. Mehrdad,Ehsani,Yimin Gao,Sabastien.E. Gay,Ali Emadi, "Modern electric, hybrid electric and fuel cell vehicles" , CRC Press.

Estimation and costing

Course code: TDEE-505

Course objective:

1. To acquaint with the fundamental concepts of electrical wiring, their estimation, costing, maintenance and contracting.

CHAPTER 1 Element 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

CHAPTER 2 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

CHAPTER 3 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

CHAPTER 4 Maintenance of Electrical Equipment

Estimation of repairs, servicing and testing cost including labor 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

CHAPTER 5 Principle of Contracting

Terms, Conditions & types of contract system, types of tenders, tendering procedure and preparation of single tender, terms & conditions of tender, procedure for inviting and scrutinizing of tender, importance of earnest money deposit, security deposit and S.O.R.

Course Outcome:

1. At the closing stage of the course, the students will be able to know the fundamentals of different electrical wiring.
2. They will be able to understand the estimating and costing of electrical equipment, contracting procedure in electrical engineering etc.

Text Books:-

1. Singh & Sapre, Communication System, TMH
2. B.P. Lathi, Modern Digital and Analog Communication System

References book:

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.)

Elective- (A)
Management Concepts & Innovative Skill
Course code: TDEE-605

Course objectives: -

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

CHAPTER-1 Entrepreneurial Development

Definition of entrepreneurship, Characteristics of entrepreneurs, Factors influencing entrepreneurship, need for promotion of entrepreneurship and small business, entrepreneurial Environment, Environmental analysis., Government policies for setting up new small enterprises

CHAPTER – 2 Planning

What is planning, types of planning, Importance of planning, steps in planning.

CHAPTER – 3 Management of Small Business Firm

Functional areas of small business firm, fundamentals of management, managerial effectiveness, resource management, office management, employees welfare & safety, factory rules and labor Laws related to SSIs , sales tax and income tax laws related to SSIs

CHAPTER – 4 Project selection, Formulation & Appraisal

Project selection & formulation, scope of project report, content & format of project report, need of project appraisal, steps of project appraisal

CHAPTER-5 Problems of Small industries

Power shortages, project planning, finance, raw material, production constraints, marketing, personal constraints, regulations.

Course outcomes:-

1. After the completion of the course, the students will be able to:
2. Have the ability to discern distinct entrepreneurial traits.
3. Know the parameters to assess opportunities and constraints for new business ideas.
4. Understand the systematic process to select and screen a business idea.
5. Design strategies for successful implementation of ideas.
6. write a business plan

References book:

1. Entrepreneurship Development in small scale proceedings of National Seminar, DCSSI, New Delhi by Patel V.G.
2. Entrepreneurship development in India by Dr. C.B. Gupta Dr. N.P. Srinivasan Sultan Chand & Sons.
3. The Business Planning Guide David H. Bangs Upstart Publishing Company, In Chicago.

Elective- (B) Power System Operation & Control

Course code: 2TDEE-601

Course objective:

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

Chapter – 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 Z_{so} , Z_{ss} , Z_{ro} , Z_{rs}

Chapter – 2 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

Chapter – 3 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
two units in a plants Transmission loss as a function of plant generation, Objectives of load flow, Bus classification

Chapter – 5 HVDC/HVAC Systems

Merits & Demerits Types of DC links Controlled Rectification & Filters Reactive Power requirements Controlled characteristics

Course outcomes: After completion of syllabus students will be able to :

1. Identify and explain the different methods of generation, distribution, control and Compensation involved in the operation of power systems.
2. Design the mathematical models of the mechanical and electrical components Involved in the operation of power systems.
3. 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:

1. Power System Protection and Switchgear (Badriram/ Tata McGraw-Hill, New Delhi)
2. Electric Power System (Ashfaq Hussain)
3. Electrical Power System (Mehta, V.K., Khanna Publishers, New Delhi)

4. Testing, Commissioning, Operation and Maintenance of Electrical Equipment (Rao, S. Tata McGraw-Hill, New Delhi)
5. ABS Course in Electrical Power(J. B. Gupta , Kalson Pub. ,Ludhiana)
6. ABS Course in Electrical Power(Soni , Gupta , Bhatnagar ,Dhanpat Rai & Sons)
Electrical Power (Uppal, S.L., Khanna Pub. New Delhi)

Electric Traction

Course Code: 2TDEX- 602

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 1: 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

Unit 2: Power Supply Arrangements-

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.

Unit 3: 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 Smoothing 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.

Unit 4:

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

Unit 5: 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.

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 torque 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. dover pitmin & sons
2. Electric traction system equipment d.w. hingle pergamo press
3. Electric traction handbook. r. Books pitman & sons.
4. Modern electric traction. h. pratap pritam burai & bros.

Energy Conservation and Management

Course Code: 2TDEX- 603

Course Objective:

The objective of this course is to get knowledge of different type of energy conservation. And Management. Like Energy use patterns and scope for conservation. Energy audit, Thermodynamics of Energy Conservation, Load curve analysis & load management, Energy efficient electric drives, Energy conservation task before industry.

SYLLABUS

Unit 1:

Energy Scenario- Various types of renewable and non-renewable energy, energy consumption and use pattern, energy consumption and environment. Energy Management and audit-Energy Management and its objectives, energy audit, need of energy audit, types of energy audit, energy auditing instruments.

Unit 2:

Waste heat recovery-Sources of waste heat, advantages of waste heat recovery, commercial waste heat recovery devices-Recuperators, Heat regenerators, heat pumps etc. Agricultural use of waste heat. Heating ventilation and air conditioning-Definition of Heating, ventilation and air conditioning, Energy saving opportunities in Heating ventilation and air conditioning, Conducting Audit in Heating ventilation and air conditioning.

Unit 3:

Role of maintenance in energy conservation-Types of maintenance breakdown, predictive & preventive, maintenance and energy conservation. Demand side management –Benefits, Demand side management Techniques, implementation of Demand side management programme, Tariff options of Demand side management.

Unit 4:

Energy efficient motor and drives-Motor efficiency, energy efficient motors, energy efficient electric drives, use of variable speed drives. Power factor improvement-Causes of low power factor, advantages of power factor improvement, methods of power factor improvement.

Unit 5:

Energy conservation in various sectors-For residential and commercial sector in transportation in energy intensive industries. Co-Generation benefits, types of co-generation. Economic Analysis of energy conservation-Economic analysis of investment, Economic analysis techniques, Risk analysis.

Course Outcome:

Student after successful completion of course must possess an understanding of how to save energy. What type of energy and how is converting. What are the advantages, disadvantages, and applications etc.

Text Books:-

- Energy Conservation and Management BYy Subhash L. Gadhave Mr. Pramod Mane Mr.Vishal Shitole
- Energy Engineering and Management by Chakrabarti A

Reference Books:

1. Energy Conservation and Management by S. K. Soni and Manoj Nair, SatyaPrakashan, New Delhi
2. Energy management- W.R.Murphy& G.M. ckey, Butter worths
3. Electrical Energy utilization & conservation – Dr. S.C.Tripathi
4. Four books published by BEE (Bureau of Energy Efficiency) Govt. of India

Course Code: 2TDEE- 604

Project
Course Code: 2TDEX- 604

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 Rojgar Yojana” projects from district Collectorate.

Professional Activity

Course Code: 2TDEX- 605

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 environmental and 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.

Course Code: 2TDEX- 605

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.

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.