

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Basic Mathematics

Course Code : R10SC1701

Course Category : Foundation

Credits : 4

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | - | 3 | 80 | 20 | - | - | - | 100 |

Rationale:

Mathematics is an important prerequisite for the development and understanding of engineering concepts. The aim of the course is to acquire some essential competencies in Mathematics by the students of diploma in Engineering. The course will help the students to think logically and systematically. The students will develop the attitude of problem solving.

Objectives:

The students will be able to

1. Understand all the basic concepts of Mathematics used in various fields of engineering.
2. Know the methods and procedures of problem solving.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Trigonometry: 1.1 Signs of trigonometric ratios. Trigonometric ratios of negative angles. Trigonometric ratios of allied angles. Trigonometric ratios of compound angles. Trigonometric ratios of multiple angles. Product, sum and difference formulae. 1.2 Inverse Circular function. Definition of inverse circular function. Principal value of inverse circular function. Simple problems. 1.3 Properties and Solution of triangle. Sine Rule. Cosine Rule. Different Methods of Solving the triangle. | 18 | 16 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | Vector Algebra: 2.1 Definition of Vector. Addition, subtraction of vectors. Direction cosines, direction ratios of line. Collinear, coplanar vectors. 2.2 Product of vectors. Dot product of vectors. Cross product of vectors. Scalar triple product of vectors. 2.3 Graphs - Graph of linear function. Graph of quadratic equation. Graph of trigonometric function, exponential function. Solution of linear, quadratic, trigonometric equations using graph. | 9 | 12 |
| 3 | Binomial Theorem: 3.1 Introduction to permutation and combination. Factorial notation. Meaning of ${}^n P_r$ and ${}^n C_r$. 3.2 Binomial theorem for positive integral index (without proof). General term in binomial expansion. Middle term in binomial expansion. Coefficient of x^r and term independent of x in binomial expansion. Binomial theorem for any rational index. Application of Binomial theorem for approximate value. | 8 | 12 |
| 4 | Determinant: 4.1 Definition of determinants. Order of determinants. Expansion of determinants of order 2 & 3. Solution of simultaneous equation in two and three unknowns (Cramer's Rule). Consistency of equations. Matrices: 4.2 Definition of a Matrix. Types of Matrices. Addition, subtraction of matrices and related problems. Multiplication of matrices. 4.3 Cofactor matrix and transpose of a matrix . Adjoint of a matrix. 4.4 Definition of inverse of a matrix and to find inverse by adjoint Method. Solution of simultaneous equation by matrix method. | 11 | 16 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 5 | The Straight Line: 5.1 The Straight Line. Slope and intercept of a line. Parallel and perpendicular lines. 5.2 Various forms of straight lines. Slope point form. Slope- intercept form. Straight line through two points. Double intercept form. General equation of straight line. 5.3 Intersection of two lines. To find slope and intercepts using general equation of line. Perpendicular distance between a point and a line. Distance between two parallel lines. | 8 | 12 |
| 6 | Circle: 6.1 Equation of a circle. Equation of a circle with centre at (h, k) and radius 'r'. To find centre and radius using general equation of a circle. 6.2 Concentric circles. Equation of tangent and normal to the circle. Statistics: 6.3 Measures of central tendency. Mean, Median and Mode for grouped and ungrouped data. 6.4 Measures of dispersion. Mean deviation. Standard deviation. Variance and coefficient of variance. | 10 | 12 |

Teaching Methodology: Chalk board, Discussion, Assignments, Printed notes.

Skills to be developed:

Intellectual Skills:

- Memorizing skill will be developed after studying the formulae of all the topics.
- Selection skill will be developed after studying the methods of solving problems during selection of appropriate formula.
- Calculation skill will be developed after studying the topics Statistics, Trigonometry, Vectors, and Determinants.
- Skill of drawing graphs will be developed after studying the topic graphs.

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Learning Resources:

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------------------|----------------------------------|-------------------------------------|
| 1 | Peter V. O'Neil | Advanced Engineering Mathematics | Thompson, Canada. |
| 2 | K. A. Stroud, D. J. Booth | Engineering Mathematics | Palgrave, New York, U.S.A. |
| 3 | S. L. Loney | Plane Trigonometry | Macmillan Publication. |
| 4 | A. M. Kulkarni | Basic Mathematics | Central Techno Publication, Nagpur. |
| 5 | B.V. Mane | Basic Mathematics | Everest Publishing House, Pune. |

B) Websites for references:

1. www.Wikipedia.com
2. www.Wolfarm.com
3. www.Mathworld.com
4. www.nptel.iitm.ac.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Engineering Mathematics Course Code : R10SC1702

Course Category : Foundation Credits : 4

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | - | 3 | 80 | 20 | - | - | - | 100 |

Rationale :

Mathematics is an important prerequisite for the development and understanding of engineering concepts. The subject intends to teach students basic facts, concepts and principles of Mathematics as a tool to analyze engineering problems. It also aims to teach students to apply the basic facts of Mathematics to solve engineering problem.

Objectives :

The students will be able to:

1. Understand the concept and principles of derivatives, functions, limits.
2. Use the principles of derivatives for the various applications.
3. Understand the methods of solving equations by using Numerical Methods.
4. Understand the principles of complex numbers.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Functions and Limits: 1.1 Definition of functions and Notation. Different types of functions. 1.2 Limits - Concept of limits, Algebra of limits. 1.3 Different methods of finding limits. Limits of algebraic function, Limits of trigonometric function. Limits of exponential functions. | 15 | 16 |
| 2 | Derivative: 2.1 Concept and definition of derivative. Derivatives of standard functions. 2.2 Laws of derivatives - Addition law. Subtraction law. Multiplication law. Division law. 2.3 Derivatives of composite functions (Chain rule). | 9 | 12 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 3 | Derivatives: 3.1 Derivative of parametric functions. Derivative of inverse functions. Derivative of implicit functions. Derivative of logarithmic functions. Logarithmic differentiation. 3.2 N^{th} order derivative. | 9 | 12 |
| 4 | Application of Derivatives: 4.1 Geometrical meaning of derivative. To find tangent and normal to the given curve. 4.2 Radius of curvature. 4.3 Physical application of derivative. 4.4 Maxima and minima using derivative. | 9 | 12 |
| 5 | Numerical Methods: 5.1 Solution of algebraic equations. Bisection method. Regula-Falsi method. Newton-Raphson method. 5.2 Solution of simultaneous equations. Gauss-elimination method. Gauss-Seidel method. Jacobi's method. | 11 | 16 |
| 6 | Complex Number: 6.1 Definition of complex number. Algebra of complex number i.e., addition, subtraction, multiplication and division of complex numbers. To express given complex number in $x + iy$ form. 6.2 Representation of complex number in a plane (Argand's diagram). Modulus and amplitude of complex number. Polar form of a complex number. Exponential form of a complex number. 6.3 Powers of a complex number - De - Moivre's theorem. The roots of a complex number. | 11 | 12 |

Teaching Methodology: Chalk board, Discussion, Assignments, Handouts.

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Skills to be developed:

Intellectual Skills:

- Memorizing skill will be developed after studying the formulae of all the topics.
- Selection skill will be developed after studying the methods of solving problems during selection of appropriate formula.
- Calculation skill will be developed after studying the topic Numerical Methods.
- Application skill will be developed after studying the topic Application of derivatives.
- Comprehension skill will be developed after studying each and every topic.

Learning Resources:

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------------------|--|--|
| 1 | K. A. Stroud, D. J. Booth | Engineering Mathematics | Palgrave, New York, U.S.A. |
| 2 | C. F. Gerald, P.O. Wheatley | Applied Numerical Analysis | Pearson Education Pte. Ltd., Singapore. |
| 3 | Peter V. O'Neil | Advanced Engineering Mathematics | Thomson, Canada. |
| 4 | Shanti Narayan | Engineering Mathematics Vol. I & II | S.Chand & Company, New Delhi. |

B) Websites for references:

1. www.Wikipedia.com
2. www.Wolfarm.com
3. www.Mathworld.com
4. www.nptel.iitm.ac.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./E&TC. ENGINEERING

Course : Basic Physics

Course Code : R10SC1703

Course Category : Foundation

Credits : 5

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 3 | 2 | 3 | 80 | 20 | - | - | 25 | 125 |

Rationale:

The development of various 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.

Objectives:

The student will be able to

1. Use different types of systems of units.
2. Identify and minimize the errors, Understand significant figures.
3. State different laws of vector and their applications.
4. Study different types of motion and their applications in engineering field.
5. Study molecular forces and explain surface tension and viscosity with applications.
6. Understand different concepts of sound and ultrasonic waves with application.
7. State different gas laws.
8. Differentiate between conduction convection and radiation.
9. Use different types of thermometers.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Units: Unit, fundamental units & examples, derived units & examples, system of Fundamental units (C.G.S., M.K.S., S.I. system of units) Rules and Conventions for the use of spacing of symbols in SI system. Table of derived S.I. units. Multiples and sub multiples of units. Significant figures, rules for significant figures. Errors in the measurements. – Types of errors, Minimization of errors, Percentage error, Propagation of errors. | 8 | 16 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | <p>1.2 Vectors: Scalar, Vector, representation of a vector, composition of vectors, resultant vector, triangle law of vectors, parallelogram law of vectors, resolution of a vector, examples on parallelogram law and resolution of a vector.</p> | | |
| 2 | <p>Linear Motion: 2.1 Speed, displacement, velocity, uniform velocity, acceleration, uniform acceleration, Equations of kinematics.- 1) $v = u + at$ 2) $s = ut + \frac{1}{2} at^2$ 3) $v^2 = u^2 + 2as$ Equations of motion for a freely falling body :- 1) $v = u + gt$ 2) $s = ut + \frac{1}{2} gt^2$ 3) $v^2 = u^2 + 2gs$ Velocity -Time graph and related examples.</p> <p>2.2 Circular Motion: Circular motion, uniform circular motion, tangential velocity, angular velocity, periodic time, frequency, relation between 1) Angular velocity and frequency, 2) angular velocity and periodic time, 3) linear velocity and angular velocity, radial acceleration, centripetal force, centrifugal force and related examples.</p> | 8 | 12 |
| 3 | <p>3.1 Applications of Circular Motion: Motion of a vehicle round a horizontal curve, banking of roads and tracks, expression for angle of banking and super elevation, centrifuge.</p> <p>3.2 Gravitation: Newton's law of gravitation and its explanation, Gravitational Constant 'G' - definition and S.I. unit. What is a satellite?, Escape velocity of a satellite, critical velocity of a satellite and its expression with examples, communication satellite.</p> <p>3.3 Simple Harmonic Motion: Periodic motion, simple harmonic motion, S.H.M. as a projection of uniform circular motion, equation of S.H.M. graphical representation of S.H.M. concepts of oscillation, periodic time, frequency, amplitude, phase, phase difference.</p> | 8 | 12 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 4 | <p>4.1 Surface Tension: Molecular forces and their nature, cohesive forces, adhesive forces sphere of influence, definition of surface tension, factors affecting surface tension (Temperature, impurity nature of the liquid), concave and convex meniscus of liquid surfaces and their explanation on the basis of molecular forces, angle of contact, capillary action and its explanation, applications of surface tension.</p> <p>4.2 Viscosity: Streamline and turbulent flow of fluids, viscous force in fluid, velocity gradient, Newton's law, Stoke's law, terminal velocity, expression for co-efficient of viscosity by Stoke's method.</p> | 8 | 16 |
| 5 | <p>5.1 Sound: Sound waves, propagation of sound, reflection of sound waves, echo, absorption of sound, co efficient of absorption, reverberation, reverberation time, formula for reverberation time (No derivation), methods for controlling reverberation time.</p> <p>5.2 Ultrasonic Waves: Ultrasonic waves, production of ultrasonic waves by magnetostriction transducer, Application – Flaw detection, drilling, welding, cleaning.</p> <p>5.3 Gas Laws: Absolute scale of temperature, Boyle's law, Charles's law, Gay-Lussac's law, general gas equation, Examples on gas laws</p> | 8 | 12 |
| 6 | <p>6.1 Modes of Heat Transfer, Temperature Measurement : Conduction – Flow of heat along a bar, steady state temp. Coefficient of thermal conductivity by Searle's method. (For good conductor) and Lee's method (for bad conductor). Convection, Radiation - Emissive power, absorptive power, black body, Stefan Boltzman law.</p> <p>6.2 Temperature Measurement: Bimetallic thermometer, resistance thermometer, thermocouple, thermopile, Pyrometers – i) Ferry's total radiation, ii) Optical Pyrometer.</p> | 8 | 12 |

Teaching methodology: Chalk board, Group Discussions, Handouts, Question Bank, PPT, Transparencies.

Term Work :

Skills to be developed:

i) Intellectual Skills:

- Identify skill will be developed after studying topics of Temperature measurement.
- Discriminating skill will be developed after studying topics on motion.
- Comprehension skill will be developed after studying concept, principles laws and rules given in the syllabus.

ii) Motor Skills:

- Measuring skill will be developed after completing practicals.
- Draw graph will be developed after completing practicals (No 6,8).
- Observing the result and comparison skill will be developed after competing practicals.

List of Experiments / Practical / Assignments:

1. Measurement of (i) length, breadth and height of a block ,(ii) internal, external diameter and height of a hollow cylinder using vernier calipers of different least counts and digital vernier.
2. Measurement of diameter of sphere and wire and measurement of thickness of a plate by using micrometer screw gauge.
3. Measurement of radii of concave and convex surfaces and thickness of plate using spherometer.
4. To find viscosity of water by Poiseuille's method.
5. To find viscosity of oil by Stoke's method
6. Calibration of thermocouple and to find unknown temperature
7. To study the effect of length and mass of the bob on periodic time of a simple pendulum.
8. To investigate relation between pressure and volume of a fixed mass of a gas. (Boyle's law)
9. To investigate relation between radius and height of liquid in the capillary tube. (surface tension)
10. Determination of co-efficient of thermal conductivity of a good conductor by Searle's method.
11. Determination of co-efficient of thermal conductivity of a bad conductor by Lee's disc method.
12. Calibration of bimetallic thermometer and Alcohol Thermometer.

Learning Resources:

A)Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---|---------------------------|--|
| 1 | R.K.Gaur, S.L.Gupta | Engineering Physics | Dhanput Raj Publications. |
| 2 | Prof.M.P.Kurian Prof.R.B.Birhade Prof.A.A.Mokashi | Applied Physics | Reliable Publications. |
| 3 | Dr.A.P.Saxena & Others | Principles of Physics | J.K.Jain Brothers TTTI, Bhopal. |
| 4 | Kamat & Rao | Applied Physics | Jeevan Deep Prakashan. |
| 5 | Mrs.V.C.Chinchwadkar | Text Book in Physics | Somaiya Publications, Bombay. |
| 6 | Umrani, Joshi, | Applied Physics | Nirali Prakashan. |
| 7 | Nelkon & Parker. | Modern Engg. Physics | S.Chand & Co. Ltd., New Delhi. |
| 8 | Nelkon & Parker. | Advanced Level Physics | CBS Pub. & Distributors, New Delhi. |
| 9 | Frands W.Sears Mork W. Zemanky Hugh D.Young | University Physics | Narosa Publishing House. |
| 10 | David Halliday Robert Resnik | Physics | Wiley Eastern Limited. |

B) Web sites for references:

1. www.physicsclassroom.com
2. www.hyperphysics.com
3. www.en.wikipedia.org
4. www.nptel.iitm.ac.in

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./E&TC. ENGINEERING

Course : Basic Chemistry

Course Code : R10SC1705

Course Category : Foundation

Credits : 5

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 3 | 2 | 3 | 80 | 20 | - | - | 25 | 125 |

Rationale :

Basic sciences like Chemistry is the foundation pillar of engineering and technology .It is most essential to learn the basic science to understand the fundamental concepts of engineering and technology.

The topic of Atomic structure and Chemical bonding is helpful to study properties of elements which are required in the engineering field.

In Electrochemistry electrical energy is obtained from the different chemical reactions which are used in different types of batteries. These batteries are widely used in automobiles and in day to day life.

Metallurgy and alloys have importance in various industries because metals are the backbone of the industries. Study of properties of metals & alloys is essential.

Nonmetallic materials such as plastic, rubber, thermal insulating materials have great importance and applications in technology.

Study of Environmental effect (Air, Water, Noise, E-Waste) at least up to awareness level is needed today because existence of the human beings is in danger. As a civilized engineer it is our duty to conserve and protect the earth.

Objectives :

The student will be able to

- 1) Draw the electronic configuration of various elements with the formation of various types of molecules.
- 2) Know electrolysis, Faraday's laws and working of different batteries.
- 3) Understand the properties and applications of various metals & alloys.
- 4) Select proper material for particular engineering situation.
- 5) Understand various types of pollution, their bad effects with controlling methods to save the earth and human beings.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | <p>Atomic Structure and Chemical Bonding:</p> <p>1.1 Fundamental particle of atom, their mass, charge locations, Atomic number, Mass number, Isotopes and isobars, Atomic weight , Molecular weight, Mole concept, Hund's rule of maximum multiplicity, Pauli's exclusion principle ,Aufbau principle,</p> <p>1.2 Electronic configuration, octet rule & duplet rule.(Electronic configuration upto Atomic number 30).</p> <p>1.3 Types of chemical bond , Electrovalent , Covalent , Coordinate and Metallic bond. Formation and structure of electrovalent molecules & Covalent molecules. eg. NaCl, CaCl₂,MgCl₂, AlCl₃, CO₂, H₂O, Cl₂, NH₃, C₂H₄, N₂, C₂H₂, NH₄, H₂O₂, SO₂. Distinction between electrovalent and covalent compounds. Properties of metallic bond (electron gas model of metallic bond).</p> | 7 | 12 |
| 2 | <p>Electrochemistry:</p> <p>2.1 Ionisation, Electrolytic dissociation, Arrhenius theory of degree of Ionisation /Dissociation and factors affecting of degree of ionization.</p> <p>2.2 Electrolysis mechanism, Electrochemical series, Electrolysis of CuSO₄ solution using platinum electrodes & Copper electrode.</p> <p>2.3 Electrochemical processes: Faradays laws of electrolysis (1st and 2nd law), Relation between ECE and CE. Numerical problems, Electrode potential , Electrochemical cells, Applications of electrolysis- Electroplating Electrorefining, Electrometallurgy, Electrotyping, Anodising of Aluminium.</p> <p>2.4 Batteries-Construction & working of dry cell, Lead acid storage cell, Nickel-Cadmium cell, Lithium cell, Fuelcell, Charging and discharging of batteries and applications. (Lead acid), Electrochemical sensors.</p> | 10 | 16 |
| 3 | <p>Metallurgy and Alloys:</p> <p>3.1 Definition – Mineral, Ore, Gangue, Flux, Slag, and metallurgy. Mechanical properties of Metals such as Malleability, ductility, tensile strength, toughness, hardness, machinability, brittleness, casting, soldering, weldability thermal conductivity , electrical conductivity .</p> <p>3.2 Stages of extraction of metals from its ore in detail ie Crushing, Concentration, Reduction, Refining.</p> | 9 | 12 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | <p>3.3 Steel-Classification of steel on the basis of percentage of carbon content in it (low, medium, high carbon steel) their properties and applications.</p> <p>3.4 Heat treatment of steel- Types of heat treatment such as annealing, normalizing, hardening, & tempering with the purpose and the process in detail.</p> <p>3.5 Definition of Alloy, purposes of making alloys, their preparation method, classification of alloys. Composition , properties and applications of following alloys-Brass, , Duralumin, Woods metal, Monel metal , Babbit metal, Nichrome.</p> | | |
| 4 | <p>Non Metallic Materials:</p> <p>4.1 Plastic (polymer)- Definition of polymer, types of polymerization, classification of polymers, difference between thermoplastic polymer and thermosetting polymer , preparation , properties and applications of following important polymers. Polyvinyl chloride, Polystyrene, Teflon, Bakelite.</p> <p>4.2 Electrical conducting polymers their types & applications.</p> <p>4.3 Rubber (elastomer) - Definition. Types of rubber , drawbacks of raw rubber and vulcanization of rubber , properties of rubber such as Elasticity , Tack , Abrasion resistance , Rebound , Tensile strength & its applications based on the properties. Synthetic rubber, properties and applications of Buna-S, Buna-N, Butyl rubber, Neoprene.</p> <p>4.4 Thermal insulating material - Definition & characteristic of thermal insulator, properties & application of Glasswool, Thermocole, Asbestos, Cork.</p> | 8 | 16 |
| 5 | <p>Environmental Effects (Awareness level):</p> <p>5.1 Nomenclature – Definition. of pollution , pollutant ,causes of pollution , types of pollution.</p> <p>5.2 AIR POLLUTION –Definition, Types of air pollutant, Sources & Effects of air pollutants such as CO_x, NO_x, SO_x, Hydrocarbons, Particulates, Automobile pollution due to IC engines & its control methods.</p> <p>5.3 Air pollution control methods – Gravitational settling chamber, Cyclone separators, Fabric filters, Electrostatic precipitators, Wet collectors or scrubbers with figures and uses.</p> <p>5.4 Global environmental issues – Green House Effect, Acid Rain, Ozone layer depletion.</p> | 7 | 12 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 6 | Environmental Effects (Awareness level), Water Pollution and Noise Pollution : 6.1 Definition of water pollution, Causes & sources of water pollution, 6.2 classification of water pollutants, such as Organic pollutants, Inorganic pollutants, Sediments, Radioactive pollutants, Thermal pollutants. 6.3 Definition of BOD, COD, DO, Eutrophication & Algal bloom Wastewater treatment –Primary & Secondary for municipal wastewater, Arsenic contamination (ground water pollution) 6.4 E-WASTE - Their origin & control measures. 6.5 NOISE POLLUTION –Definition, sources, effects , Levels of noise , Noise level standards & control. | 7 | 12 |

Teaching Methodology : Chalk board, Discussion, Assignments, Handouts, Question Bank.

Term Work:

Skills to be developed:

i) Intellectual Skills:

- Understand the concept of Construction & working of different batteries.
- Calculation of C.E. & E.C.E.
- Selection of different alloys and non metallic Materials after reading.

ii) Motor Skills:

- Measurement of sound level.
- Learning of different standard parameters for various types of pollution.

List of Practicals/Experiments :

- 1) To determine the percentage of iron in given ferrous alloy by KMnO_4 method.
- 2) To determine alkalinity of a given water sample.
- 3) To determine percentage of copper from brass sample.
- 4) To determine the acid value of a given plastic material.
- 5) To determine Dissolved Oxygen in a given water sample by winkler's method.
- 6) To determine the chloride ions in given water sample by Mohr's method.
- 7) To determine percentage of Nickel from the Monel metal by using Eriochrome black T indicator. (by back titration method).
- 8) To determine the neutralization point of weak acid and weak base using conductivity meter.
- 9) To determine the ECE of copper by electrolysis of CuSO_4 solution.
- 10) To determine phosphate in a given water sample by using Spectrophotometer.
- 11) To determine Noise of the traffic by sound level meter.
- 12) Preparation of phenol formaldehyde resin (Bakelite).

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Learning Resources:

A)Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------------------------------|--|---|
| 1 | Sharma B.K. & Kaur H. | Environmental Chemistry | Goel Publishing House, Meerut. |
| 2 | Jain P.C. & Jain Monika | Engineering Chemistry | Dhanpat Rai Publishing Company (P) Ltd., New Delhi. |
| 3 | Uppal M.M. | Engineering Chemistry | Khanna Publisher, Delhi. |
| 4 | Gadag R.V. & A. Nityananda shetty | Engineering Chemistry | I.K. International Publishing House Pvt. Ltd., New Delhi. |
| 5 | Balsaraf V.M., Pawar A.V. & Mane P.A. | Applied Chemistry Vol. I & II. | I.K. International Publishing House Pvt. Ltd., New Delhi. |
| 6 | Kuriacose J.C. & Jairam J. | Chemistry in Engineering & Technology Vol. I & II. | Tata Mcgraw Hill. |
| 7 | De A.K. | Environmental Chemistry | New Age International (P)Limited, Publisher, New Delhi. |
| 8 | Palanna O.G. | Engineering Chemistry | Tata McGraw Hill Education Private Limited, New Delhi. |

B) Web site for references:

1. www.in.wikipedia.org
2. www.mpcb.com
3. www.cpcb.com
4. www.nptel.iitm.ac.in

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./E&TC. ENGINEERING

Course : Applied Science Course Code : R10SC1706

Course Category : Foundation Credits : 8

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|-----|--------------------|----|------|----|----------------|-----------|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2+2 | 2+2 | - | - | - | - | 50(25+25) @ | 50(25+25) | 100 |

@ Internal examination

Rationale:

Applied Science includes applied Chemistry as well as applied Physics. The development of various 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

Applied Chemistry involves science and chemical principle that have resulted into development of new materials used in modern age. The topic water has wide application in all branches of engineering & technology. In the curriculum topic like Corrosion & its protection is needed for every engineering field. Whereas the study of the Lubricants is needed to know how various types of machines work smoothly and efficiently in various conditions. Students must know the efficiency of various types of fuels, its calorific value and the importance of chemical analysis of the fuel in engineering field.

Objectives:

The student will be able to

1. State the principle and measure the EMF by potentiometer.
2. Understand the concept of resistance and capacitance.
3. Study magnetic effect of electric current and apply right hand thumb rule.
4. Study effect of magnetic field on current carrying conductor and apply Fleming's left hand rule.
5. Study principle, construction, working of galvanometer and its application as ammeter, voltmeter and ohmmeter.
6. Differentiate magnetic materials and study their applications in engineering field.
7. Explain different terms related to lasers, its properties and application in engineering field.
8. Understand the types of impurities present in water, as well as its removal i.e purification processes such as ion exchange method, lime soda method etc and important analytical test of drinking water.

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9. Understand definition of corrosion, its mechanism & different factors affecting the corrosion. Protection methods like cathodic protection and application of different metal coating.
10. Select proper lubricant for various frictional parameters.
11. Understand how conventional as well as non conventional energy is used for mankind.

Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | <p>1.1 Measurement of Resistance and EMF. : Definition of charge ,current, Potential difference, specific resistance, colour code for resistance, types of resistance, resistance in series & parallel combinations (numerical), concept of temperature dependence of resistance, thermistor, principle of potentiometer, measurement of EMF by potentiometer (numerical)</p> <p>1.2 Measurement of Capacitance: Capacitor & capacitance, units, types of capacitor (air, solid dielectric, electrolytic) capacitor in series and parallel combinations (numerical).</p> | 12 | - |
| 2 | <p>2.1 Effect of Magnetic Field on Current Carrying Conductor: Force of a magnetic field on current carrying conductor, (No derivation) Fleming's left-hand rule, couple acting on a rectangular coil placed in the uniform magnetic field.</p> <p>2.2 Magnetism: Magnetic materials, permeability, susceptibility, relation between relative permeability and susceptibility, properties of diamagnetic, paramagnetic and ferromagnetic substances, B H curve ,ferrites and their application-antenna cores, television picture tube.</p> <p>2.3 Magnetic Effect of Electric Current: Magnetic effect of electric current, lines of induction due to a straight conductor; right-hand thumb rule, magnetic induction (direction and magnitude), concept of uniform field.</p> | 10 | - |
| 3 | <p>3.1 Lasers: Excitation of particle, optical pumping, types of transitions – non radiative and radiative, spontaneous and stimulated emission, population inversion, resonance cavity, active system.</p> | 10 | - |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | <p>3.2 Principle of Laser: Principle of laser, types of lasers, - ruby laser, Helium-Neon laser, comparison between ruby and He-Ne lasers, Uses of lasers – as carrier waves, metal cutting communication, Computers, drilling, radars, depth sounding etc.</p> <p>3.3 Fiber Optics: Principle properties & applications.</p> <p>3.4 Nanotechnology: Introduction to nanotechnology, principle and application.</p> | | |
| 4 | <p>Water:</p> <p>4.1 Types of impurities in the natural water, potability of water.</p> <p>4.2 Treatment for drinking water (Screening, Sedimentation, Coagulation, Filtration, Sterilization). Soft water, Hard water.</p> <p>4.3 Types of hardness of the water ,Disadvantages of hard water in steam generation in boiler ,</p> <p>4.4 Degree of hardness of the water in terms of P.P.M.of CaCO_3 equivalent.</p> <p>4.5 Desalination of Sea water (brakish) by i) Electrodialysis, ii) Reverse Osmosis.</p> <p>4.6 Removal of hardness by water softening methods-Lime Soda process, Ion exchange process.4.7 Concept of PH of the solution, Definition of PH, PH scale, Numerical problem on PH.Measurements of PH, Industrial application of the PH.</p> | 10 | - |
| 5 | <p>Corrosion and Protective Coatings:</p> <p>5.1 Definition of Corrosion, Different environmental agencies causing corrosion of the metals.</p> <p>5.2 Types of corrosion , Dry & Wet corrosion theory Mechanism of Electrochemical corrosion – i) Evolution of hydrogen type, ii) Oxygen absorption type.</p> <p>5.3 Galvanic corrosion, concentration cell corrosion, Electrode potential, Galvanic series.</p> <p>5.4 Factors affecting corrosion (a) Nature of the metal, (b) Nature of corroding environment.</p> <p>5.5 Protective coatings-Inorganic coating-Chromate, Phosphate Chemical oxide coating.</p> <p>5.6 Cathodic protection.</p> <p>5.7 Metal coating application –(i)Hot dipping-Galvanization & Tinning,) (ii)Metal Spraying, (iii)Cementation–Sherardizing, (iv) Electroplating, (v) Metal cladding.</p> | 10 | - |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 6 | <p>Lubricants and Fuels:</p> <p>6.1 Lubricant-Definition, characteristic of a good lubricant.</p> <p>6.2 Types of lubrication-i) Fluid film lubrication ii) Boundary Lubrication iii) Extreme pressure Lubrication.</p> <p>6.3 Properties of lubricant-Viscosity, Viscosity Index, Emulsification, Oiliness, Oxidation, Flash point, Fire point, Cloud point, Pour point, Acidity, Volatility, & Saponification value.</p> <p>6.4 Selection of Lubricant for -Internal combustion engine, Cutting tools, Gears, Steam turbines, Delicate instruments, Transformers, Very high pressure and low speed machines Refrigeration system.</p> <p>6.5 Fuels- Definition, Types of fuels.</p> <p>6.6 Combustion, Units of heat measurements, Calorific value Ignition temperature.</p> <p>6.7 Types of coal-Peat, Lignite, Bituminous and Anthracite coal.</p> <p>6.8 Analysis of the coal by Proximate and Ultimate analysis.</p> <p>6.9 Refining of crude petroleum ,Different fractions obtained by distillation of crude oil from refinery.(with Carbon composition, Boiling point range and applications)</p> <p>6.10 Study of gaseous fuels such as LPG & CNG.</p> <p>6.11 Non conventional sources of energy-Biomass & Biogas.</p> | 12 | - |

Teaching methodology: Chalk board, Group Discussions, handouts, Question Bank, PPT, Transparency, Seminar, Guest Lecture.

Term Work :

Skills to be developed:

i) Intellectual Skills:

- Discrimination skill will be developed after studying topics : types of resistor and capacitors ,types of lasers.
- Comprehension skill will be developed after studying concept ,principles laws and rules given in the syllabus.
- Comprehension skill will be developed after studying topics: Corrosion and water.
- Selection skill will be developed after studying topics: Lubricants and Fules.

ii) Motor Skills:

- Drawing and connecting circuit skill will be developed after completing practicals.
- Measurement skill will be developed after completing practicals.
- Observing the result and comparing skill will be developed after completing practicals.
- Testing skill will be developed after studying purity skills of alloys and environmental effects (water, air, noise pollution).

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List of Practicals/Assignments/Experiments:

Applied Physics:

- 1) Specific resistance by voltmeter ammeter method.
- 2) Measurement of e.m.f. by potentiometer.
- 3) To study the effect of temperature on the resistance of – thermister.
- 4) To study the effect of temperature on the resistance of - copper coil.
- 5) Measurement of resistance by using colour code and digital multimeter.
- 6) Orested experiment.

Applied Chemistry:

- 1) Determination of Total hardness of water by using EDTA method.
- 2) Determination of Total residual Chlorine in the given water sample.
- 3) To determine moisture contents in a given coal sample by proximate analysis.
- 4) To determine ash contents in a given coal sample by proximate analysis.
- 5) Determination viscosity of liquid by using Ostwald viscometer.
- 6) Determination of pH of different solutions by using pH meter.

Learning Resources: A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---|-------------------------------------|---|
| 1 | R.K.Gaur, S.L.Gupta | Engineering. Physics | Dhanput Raj Publication. |
| 2 | Prof.M.P.Kurian Prof.R.B.Birhade Prof.A.A.Mokashi | Applied Physics | Reliable Publications. |
| 3 | Dr.A.P.Saxena & Others | Principles of Physics | J.K.Jain Brothers TTTI, Bhopal. |
| 4 | Mrs.V.C.Chinchwadkar | Text Book in Physics | Somaiya Publications, Bombay |
| 5 | David Halliday Robert Resnik | Physics | Wiley Eastern Limited. |
| 6 | Jain P.C. & Jain Monika | Engineering Chemistry | Dhanpat Rai Publishing Company (P) Ltd., New Delhi. |
| 7 | Narkhade S.N. | Applied Science | Nirali Prakashan, Pune. |
| 8 | Gadag R.V. & A.Nityananda shetty | Engineering Chemistry | I.K. International Publishing House Pvt. Ltd., New Delhi. |
| 9 | Balsaraf V.M., Pawar A.V. & Mane P.A. | Applied Chemistry (Vol - I & II) | I.K. International Publishing House Pvt. Ltd., New Delhi. |
| 10 | Palanna O.G. | Engineering Chemistry | Tata Mcgraw Hill Education Pvt. Ltd., New Delhi. |

B) Web sites for references:

1. www.physicsclassroom.com
2. www.hyperphysics.com
3. www.in.wikipedia.org
4. www.nptel.iitm.ac.in

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Technical English Course Code : R10SC1707
Course Category : Foundation Credits : 4

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 2 | 3 | 80 | 20 | - | - | 25 | 125 |

Rationale:

Students need effective writing skill in their academic and professional life. This syllabus is need based and special efforts are taken to improve the writing skills of students. Students admitted to polytechnic come from rural and urban areas. They are from different mediums and backgrounds. As the students are weak in writing correct English, more stress is given on improving their basic concepts of written communication.

Objectives:

The students will be able to

1. Learn the basic concepts of grammar and sentence formation.
2. Express their ideas logically and correctly.
3. Comprehend the given passage and arrange their ideas in sequential order.
4. Improve their presentation skills in oral and written communication.
5. Interact effectively from the industry point of view.
6. Use the various formats of business correspondence.

Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Grammar: 1.1 Parts of Speech. 1.2 Transformation of sentences. 1.3 Features of technical writing. | 8 | 16 |
| 2 | Communication: 2.1 Written and oral communication. 2.2 Barriers in communication. 2.3 Principles of communication | 4 | 12 |
| 3 | Applied Writing: 3.1 Paragraph writing. 3.2 Comprehension. 3.3 Précis writing. | 4 | 12 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 4 | Office Drafting: 4.1 Notice and Circular. 4.2 Memo. 4.3 Email writing. | 4 | 12 |
| 5 | Business Correspondence: 5.1 Letter of Enquiry, Order and job application. 5.2 Letter of Complaint, resignation, reminder. 5.3 Joining letter, appreciation letter. | 8 | 16 |
| 6 | Report writing: 6.1 Visit report. 6.2 Accident report. 6.3 Progress report, Investigation report. | 4 | 12 |

Teaching Methodology : Chalkboard, white board, improved lecture method, discussion method, power point Presentations, case study.

Term Work:

Skills to be developed:

i) Intellectual Skill :

- Speaking and listening skills will be developed on completion of the assignment nos.7-12 of term work.
- Presentation skills will be developed on performance of assignment nos.1-6 of term work.
- Writing skills will be developed by studying topics of Applied writing, Office drafting, Business correspondence and Report writing.
- Reading and comprehension skills will be developed by studying the topic of Comprehension.

ii) Skills to be developed in Professional practices are included in these assignments.

List of Practical/Assignment/Experiment:

1. Self introduction. (Professional Practices)
2. Technical presentation. (Professional Practices)
3. Elocution. (Professional Practices)
4. Power Point presentation. (Professional Practices)

5. Email Writing.
6. News Presentation. **(Professional Practices)**
7. Introduction of basic English words and their pronunciation.
8. Introduction of friend, guest, visitors.
9. Meeting and greeting people.
10. Talking about the family.
11. Giving directions about places in town.
12. Describing your home, neighbourhood and region.

(Note: Practical no.7 to 12 will be covered by using Linguaphone Language lab machine. In every practical student will solve the assignment based on that unit. Student will learn basic English words, their pronunciation, introducing new situations and rules to keep the conversation going).

Learning Resources :

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------------------|---|---|
| 1 | Locker, Stephen Kyo Kaczmarek | Business Communication : Building Critical Skills | Published by McGraw Hill Professionals. |
| 2 | Alok Pandey & Deepak Pandey | Advanced English Grammar & Composition | Published by Sahni Publication, Delhi-7. |
| 3 | Raymond Murphy | Intermediate English Grammar | Published by Foundation Book 2003 (Second Edition), New Delhi. |
| 4 | Raymond Murphy | Essential English Grammar | Published by Foundation Book Pvt. Ltd., 2004 (Second Edition), New Delhi. |
| 5 | M.P. Bhatia | Applied Grammar & Composition | Published by M.I. Publications (Eighth Revised Edition), Agra. |

B) Web sites for references :

1. www.learn4good.com
2. www.fluentzy.com
3. www.edufind.com
4. www.khake.com
5. www.learnenglish.org.uk
6. www.english4engineer.com
7. www.owl.english.purdue.edu

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DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Communication Skill Course Code : R10SC1708

Course Category : Foundation Credits : 3

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 1 | 2 | - | - | - | - | - | 50 | 50 |

Rationale:

The old course materials comprising anthologies of prose selections and the old methodology based mainly on the classroom lecture are not conducive to the development of study skills and communicative competence in the students. Therefore, a need to develop an appropriate course in English for students of engineering and technology and to adopt an innovative approach to English language teaching and learning is essential. The aim of this course is to impart to the students the necessary communication skills that they need in their academic and professional life.

This course demands an actual use of the English language by students in the classroom and encourages interaction among them. It is designed to develop the linguistic skills and not to test their memory skills. In this new approach, all the four skills involved in learning a language, namely- 1) Listening 2) Reading 3) Writing 4) Speaking are developed.

Objectives:

The students will be able to

1. Practice the basic skills of speaking, reading, listening and writing.
2. Express their ideas correctly and fluently in English.
3. Interact with others in English and gain confidence in the use of the English language.
4. Realise the importance of effective presentation skill.
5. Improve their communication skill that will lead to their overall personality development.

Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Presentation Skills: 1.1 Personal grooming. 1.2 Matter of presentation. 1.3 Manner of presentation. | 3 | - |
| 2 | Interview Techniques: 2.1 Communication skills. 2.2 Stress management. 2.3 Presence of mind. | 3 | - |

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Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 3 | Group Discussion Techniques: 3.1 Manners and etiquettes. 3.2 Discussion rules. 3.3 Effective presentation of views. | 3 | - |
| 4 | Body Language: 4.1 Facial expressions. 4.2 Posture and gesture. 4.3 Eye movements. | 3 | - |
| 5 | Resume Writing: 5.1 Correct language. 5.2 Strengths and achievements. 5.3 Format of biodata. | 2 | - |
| 6 | Vocabulary: 6.1 Synonyms. 6.2 Antonyms. 6.3 Homonyms. | 2 | - |

Teaching Methodology : Chalk board, Whiteboard, Discussion Method, Power Point Presentation, Case study, Improved Lecture Method etc.

Term Work:

Skills to be developed:

- i) **Intellectual Skills :**
 - Listening and speaking skills will be developed on completion of assignments of Term work & the topic of group discussion techniques.
 - Presentation skills will be developed by studying the topic of Presentation skills and after performing the assignments based on it.
 - Writing skills will be developed by studying topic of resume writing.
- ii) Skills to be developed in Professional practices are included in these assignments as presentation and guest lectures.

List of Practical/ Assignment/Experiment

1. Interview of the candidates. (**Professional Practices**)
2. Debate on different topics. (**Professional Practices**)
3. Poster Presentation. (**Professional Practices**)

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4. Group discussion. (Professional Practices)
5. Role Play. (Professional Practices)
6. Power Point Presentation. (Professional Practices)
7. Talking about different jobs and types of work.
8. Talking about your hobbies and enquiring about those of other people.
9. Enquire about people's programmes, plans and booking facilities.
10. Telephone etiquettes and information about the postal service.
11. Talking about the public transport system .
12. Talking about accommodation facilities in a hotel & shopping.

(Note: Practical no.7 to 12 will be covered by using Linguaphone Language lab machine. In every practical student will solve the assignment based on that unit. Student will learn the conversation techniques, pronunciation, etiquettes, manners and he will develop the ability to speak in different situations).

Learning Resources :

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------------------------|---|---|
| 1 | Dr.B.R.Kishore , D.S.Paul | Kumar's Group Discussions and Interviews | Vee Kumar Publications Private Limited,New Delhi-110008. |
| 2 | Adam B. Cooper | PowerPoint Presentations that Sell | McGraw Hill Professionals. |
| 3 | R.C.Bhatia | Business Communication | Ane Books India,New Delhi. |
| 4 | Krishna Mohan, Meera Banerji | Developing Communication Skills | Published by Rajiv Beri for Macmillan India Ltd., New Delhi. |

B) Web sites for references:

1. www.skillstudio.co.uk
2. www.khake.com
3. www.search4excellence.com
4. www.selfgrowth.com
5. www.mindtools.com

DIPLOMA PROGRAMME : ELECT./COMP./E&TC. ENGINEERING

Course : Engineering Graphics Skill Course Code: R10ME 1202

Course Category : Foundation Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 4 | - | - | - | - | - | 50 | 50 |

Rationale:

Drawing which is known as the language of engineers is widely used means of communication among the designers, engineers, technicians & craftsmen in an industry. The translation of ideas into practice without the use of this graphic language is really beyond imagination. Thus for the effective & efficient communication among all those involved in an industrial system, it becomes necessary for a diploma engineer to acquire the appropriate skills in the use of graphic language. This preliminary course aims at building a foundation for the further courses in drawing and other allied subjects.

Objectives:

The students will be able to

1. Understand basic principles of engineering drawing.
2. Draw orthographic projections of different objects
3. Draw isometric view from given two orthographic views.
4. Understand and Draw various engineering curves and know their applications.

Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Introduction to Course : 1.1 Use of instruments, types of lines, types of letterings, full, enlarging and reducing scales, dimensioning techniques (As per IS CODE SP-46). 1.2 Geometrical Constructions :- To construct a regular polygon of given side. To construct a regular polygon in a given circle. To inscribe a circle in a given polygon. To circumscribe a circle around a given polygon. To draw circles touching each other and sides of a given polygon internally & externally. | 10 | - |

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Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| | 1.3 Tangent Exercises :- To bisect a given straight line/ arc /angle. To divide a given straight line into given number of equal parts. To draw a normal to a given straight line/ arc from a given point within or outside it. To draw a straight line parallel to a given straight line /arc through point/ at a given distance. To draw an arc touching to two straight lines / two arcs (internally/ externally)/ one line & one arc. To draw an internal/ external tangent to two given arcs apart from each others. | | |
| 2 | 2.1 Redraw Figures : To redraw the given figure (using the knowledge of geometrical constructions and tangent exercises). 2.2 Construction of Curves : To study the construction of following curves using the method mentioned against them. 2.3 Ellipse – Directrix focus method, arcs of circle method and concentric circle method. 2.4 Parabola – directory focus method and rectangle method. Involutés – of a polygon, of a circle and of combination of a polygon and circle. | 6 | - |
| 3 | Orthographic Projection: Conversion of simple pictorial views into orthographic projections using first angle and third angle method of projections. Dimensioning the views. | 4 | - |
| 4 | Sectional Views: Conversion of simple pictorial views into sectional orthographic projections using first angle and third angle method of projection. Dimensioning the views. | 4 | - |
| 5 | Isometric Projections and Views: Construction and use of isometric scale. Conversion of simple orthographic views into isometric projections / views. | 6 | - |
| 6 | Freehand Sketches: The ends and thread profiles. Conventional representation of threads. Types of nuts, bolts, washers, set screws. Types of rivet heads and riveted joints. Types of sections – full, half, revolved, removed offset. Conventional breaks for circle and rectangular sections. | 2 | - |

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Teaching Methodology: Discussions, Chalk Board, Charts, Models, Transparencies.

Term Work:

Skills to be developed:

i) Intellectual Skills:

- Conversion of given Orthographic Views into Isometric & vice –versa.
- Visualization of an object.
- Drawing of sectional views.

ii) Motor Skills:

- Use of various drawing instruments.
- Drawing of various Engineering Curves.
- Redrawing the given figures.
- Free hand sketching of machine components.

List of Drawing Sheets / Assignments:

| Sr.No. | Topic Name | No. of sheet |
|--------|--|--------------|
| 1. | Geometrical constructions and tangent exercise | 1 |
| 2. | Redraw and Engineering Curves | 2 |
| 3. | Orthographic views | 2 |
| 4. | Sectional views | 2 |
| 5. | Isometric views | 2 |
| 6. | Freehand sketches | 1 |

Learning Resources :

Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------|---------------------------------|---|
| 1 | N.D. Bhatt | Engineering Drawing | Charotar Publication, Anand. |
| 2 | Mali and Chaudhary | Engineering Drawing | Vrinda Publications, Jalgaon. |
| 3 | Kamat & Rao | Engineering Drawing | Jeevandeep Publicatons, Mumbai. |
| 4 | N.Y. Prabhu | Geometrical Engineering Drawing | Pune Vidyarthi Griha, Publications, Pune. |
| 5 | Ozarkar & Utturkar | Engineering Drawing | Maharashtra Publishing House. |
| 6 | K. Venugopal | Engineering Drawing | New Age International Ltd., Delhi. |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : MECHANICAL / ELECTRICAL ENGINEERING

Course : Computer Awareness Course Code : R10ME1206

Course Category : Foundation Credits : 05

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|-----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 1 | 4 | - | - | - | 25@ | - | 50 | 75 |

@ Internal Examination

Rationale:

Computers have invaded into day-to-day life to a large extent. This foundation course is aimed at making student familiar with computer hardware, operating system, preparation of a document through MS Word, creating tables using MS Excel and preparing presentations using MS Power Point.

Objectives:

The students will be able to

1. Understand and identified different hardware components.
2. Know about different operating system.
3. Create document, table, and presentation using MS-OFFICE software.
4. Understand various tool bars of AutoCAD.
5. Draw the simple drawing.

Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Introduction: - 1.1 Introduction to computer and applications. History of computer: - Generation and types. 1.2 Representation of data in computers: - bit, byte, and ASCII, binary system, conversion of decimal to binary, memory size in terms of bytes, kilo bytes, giga bytes & tera bytes. 1.3 Computer network: - LAN, MAN, WAN, Firewall, intranet, extranet, Internet, Topology (star, bus, ring). | 2 | - |
| 2 | Components of Computer: - 2.1 Hardware: - Processors, Memory (RAM, ROM, PROM, EPROM, EEPROM), Input devices (Keyboard, mouse, touch screen, Voice recognition system, scanner), Output devices (Plotter, printer, monitor), Storage devices (Tapes and disks). Storage Capacity of various floppies. 2.2 Software: System software like Operating system(Win98, UNIX, LINUX), assembler, compiler, application software like MS-Office, AutoCAD, Introduction to programming language (C, C++). | 3 | - |

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Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 3 | MS-Word - Office 2007 : 3.1 Introduction. Starting of MS-Word. 3.2 Creating and Editing a document. Formatting a document:- Font and type size, paragraph formatting, justification, copy and paste, inserting, preview and printing, indent, footer, header, macro, mail-merge, hyperlink. 3.3 Other features: - find and replace, tables, grammar and spell check. | 2 | - |
| 4 | MS-Excel - Office 2007 : 4.1 Introduction. Starting of MS-Excel. Creating and Formatting a document. Features: - Auto sum, drag and drop, auto fill, insert clipart, row and column. Charts: - Column, bar, pie, line area. 4.2 Formula and functions:- Types, terms like cell address, types of references, values, objects, add insns. | 3 | - |
| 5 | 5.1 MS-Power Point - Office 2007 : Introduction. Application- presentation and slide show. Creating and displaying a presentation. Advantages. MS-access-introduction & basic, creating a database and handling queries. 5.2 Internet: - History and use. Basics of www. Various domain name. Search Engines. E- commerce. E- mail and chat. Internet protocols, viruses and anti-viruses. | 2 | - |
| 6 | Auto Cad 2009 : 6.1 Introduction: - version, need, changes after its implementation. Advantages, basic shapes and objects, co-ordinate system (Cartesian, polar, absolute, relative.). Starting with A-Cad: - Creating, editing and saving the file, various commands. 6.2 Various Commands: Draw command: - line, mline, spline, polygon, rectangle, arc, circle, spline, donut, ellipse, hatch, text, example. | 4 | - |

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Course Details:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | 6.3 Modify command: - Erase, copy, mirror, offset, array, move, rotate, trim, extend, break, chamfer, fillet, explode, example. Formatting command:- properties, match properties, hatch edit, pedit, spline edit, ddedit (for text), chprop, osnap. Dimensioning command:- linear, angular, radial, aligned. View command:- zoom, pan, redraw, regen, regen all. Settings: - Limits, scale, grid, unit, calling various toolbars. Introduction to 3D and autolisp. | | |

Teaching Methodology: Chalk- Board, Discussions, PPT, Guest lectures, Transparencies, Computers.

Term Work:

Skills to be developed:

i) Intellectual Skills :

- Understand different hardware components.
- Understand the operation of different operating systems.

ii) Motor Skills :

- To get conversant with MS OFFICE & AUTOCAD.

| Sr.No. | Title | No. of Assignment |
|--------|--|-------------------|
| 1. | Assignments based on MS Word | 3 |
| 2. | Assignments based on MS Excel | 3 |
| 3. | Assignments based on MS PowerPoint | 3 |
| 4. | Make block of outline of drawing sheet | 1 |
| 5. | Redraw Figures | 3 |
| 6. | Orthographic Projections | 3 |
| 7. | Orthographic with sections and layer | 2 |
| 8. | Isometric views | 2 |

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Learning Resources:

Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------|-------------------------------------|-------------------------|
| 1 | Moseley and Boodey | Mastering MS-Office Professional | BPB Pub. |
| 2 | Laura Acklen | Ten minutes guide to MS-Office 2000 | PHZ Pub. |
| 3 | Greg Harvey | Excel for Dummies | IDG Pub. |
| 4 | Tom Badgekt | Teach yourself Power Point | BPB Pub. |
| 5 | D.D. Voisonet | Introduction to CAD | McGraw Hill, New Delhi. |
| 6 | Alan and Miller | The ABC's of AUTOCAD | BPB Pub. |
| 7 | George Omura | Mastering AUTOCAD | BPB Pub. |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : General Mechanical & Civil Engineering Course Code : R10ME2201

Course Category : Allied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|-----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 4 | - | - | - | - | 50@ | 50 | 100 |

@ Internal Examination

Rationale:

An electrical engineer during his/her career has to deal with various aspects in mechanical and civil engineering like selection and installation of drive components, preparation of foundation for electrical equipments like transformers, motors etc. In this course the students will learn about basics of mechanical and civil engineering.

Objectives:

The students will be able to

1. Understand the construction & operation of the basic equipments like boiler steam-turbine, IC engines & pumps.
2. Know about power transmission components like Pulleys, belts, Couplings & Gears.
3. To know about the principals of Surveying, and Leveling.
4. To know about various constructions material used & general procedure for construction of masonry.

Course Contents: Section I Mechanical Engineering

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Properties of Steam: Steam formation, definition of various terms, introduction to steam table & its use. | 4 | - |
| 2 | Boiler, Steam Engines & Turbine: Basic concepts of various types of boilers. Construction & working of steam engine. Principles of working of steam turbines, classification of steam turbine & their operation. | 3 | - |
| 3 | I.C. Engines: Construction & classification of I.C. Engines. | 4 | - |
| 4 | Introduction to Pumps: Classification of pumps, construction & working of centrifugal & reciprocating pumps. | 3 | - |
| 5 | Power Transmission Components: Classification & study of various power transmission components like pulleys, belts, couplings & gearboxes. Classification & selection of various types of bearings. | 3 | - |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details: Section II Civil Engineering

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Surveying: Definition, Principles. Introduction to distance measuring instruments like 20 m, chain, steel/plastic tape & ranging rods. Chaining & ranging procedures. Offset & offsetting by open cross staff. Leveling: Definition of leveling, introduction to dumpy level & leveling staff. Finding out difference in elevation by simple & compound leveling. | 5 | - |
| 2 | Civil Engineering Materials: Bricks- conventional & IS size. IS specification of cement- type's requirements field tests. Aggregates-necessity, IS specification. Steel- types & characteristics of structural steel. Concrete – Definition, types (RCC & PCC), Steps in manufacture, grades, and requirement in fresh & hardened state. | 5 | - |
| 3 | Construction Technology: Types of structure- load bearing & framed. Foundation-Definition, types of foundations. Concept of bearing capacity & introduction to machine foundation. General procedure of construction of masonry & plastering. Introduction to structural components like slabs, beams, columns-principles of their design & important points to be observed during their construction. | 5 | - |

Teaching Methodology: Chalk Board, Discussion, PPT, Guest Lectures.

Term Work:

Skills to be developed:

i) Intellectual Skills:

- Understand the working of various mechanical devices like turbines, pumps, IC engines & Power transmission components.
- Understand the various equipments used for Surveying, leveling.
- Understand the basic principle of construction technology.

ii) Motor Skills:

- Handling of equipments used for surveying & leveling.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Sec. I The term work in Mechanical Engineering should consist of the following -

1. Study of boiler.
2. Study of steam engine/turbine.
3. Study of I.C. engine.
4. Study of centrifugal pump.
5. Study of reciprocating pump.
6. Study of various types of couplings.
7. Study of pulleys & belts.
8. Study of bearings & gearboxes.

Sec. II The term work in Civil Engineering should consist of the following -

1. Study of distance measuring equipments like 20 m chain, tapes & ranging rods.
2. Chaining & ranging a line about 50m in length.
3. Chain & cross staff survey of small area.
4. Study of Dumpy level, its adjustments & leveling staff.
5. Compound leveling & fly leveling.
6. Testing of concrete for workability & compressive strength.
7. Study of bonds for half & one brick masonry.
8. Listing of material requirements, work outputs, material & labour rate for some common construction items like- half & one brick thick masonry in cement mortar.

Books: :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------|------------------------|-----------------------|
| 1 | Khurmi Gupta | Applied Thermodynamics | TTTI, Bhopal. |
| 2 | Kanitkar | Surveying and Leveling | McGraw Hill Co., IND. |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : General Engineering (Workshop) Course Code : R10ME2202

Course Category : Allied Credits : 03

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 1 | 2 | - | - | - | - | - | 50 | 50 |

Rationale:

The students will know the various tools & machinery used in the workshop, various fitting, welding techniques & tin smithy work. To develop practical skills in handling various tools, accessories & equipments in designing / testing.

Objectives:

The students will be able to

1. Know the various tools & machinery in the workshop, various fitting, welding techniques & tin smithy work.
2. Skills in handling various tools, accessories & equipments in designing/testing electronic circuit.
3. Develop skills for identifying, testing various electrical components, measurement of electrical parameters & to be familiar with different wiring systems.

Course Contents:

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Introduction to hand tools like Screw Drivers, Spanners, Files, Vices, and Pliers etc. used in Workshop. | 5 | - |
| | 1.2 General information about center lathe, milling machine & drilling machine. | 5 | |
| | 1.3 Introduction of general Workshop Processes – Welding, Brazing, Soldering, Tin smithy. | 6 | |

Teaching Methodology: Chalk Board, Discussion, PPT, Guest Lectures.

Term Work:

Skills to be developed:

i) Intellectual Skills:

- Identify joining methods for fabrication
- Ability to read & interpret job drawings.
- Ability to identify and select proper material, tools and machines.

ii) Motor Skills:

- Identify, select and use various marking, measuring and holding, striking and
- Cutting tools & equipments in various shops.
- Operate lathe and milling, drilling machines.
- Produce jobs as per specified dimensions.
- Inspect the job for specified dimensions.
- Use welding machines and equipment
- Adopt safety practices while working on various machines.

The term work shall consist of

1. One job of Tin Smithy.
2. One job of Turning & Drilling.
3. One job of Welding.
4. One job of Brazing.
5. Identification of tools.
6. Study of different machines mentioned in theory.
- 7 Bend Rebend Test on Steel bars.
- 8 Torsion test on mild steel bar (ductile material).

Learning Resources:

Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------------------------|------------------------------------|-------------------------------|
| 1 | Hazara Chaudhari S.K. & A.K. | Workshop technology Vol. I & II | Media Promoters & Publishers. |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Industrial Organisation & Management

Course Code : R10ME2203

Course Category : Allied

Credits : 03

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 3 | - | 3 | 80 | 20 | - | - | - | 100 |

Rationale:

This course is classified under human sciences and is intended to teach students about structure of organization, types of organization, principles of management, functioning of personnel department, industrial laws, and inventory control methods. It also envisages giving exposure to accountancy principles and various networking methods.

Objectives:

The students will be able to

1. Understand the concept of different business organization.
2. Know activities in the various departments like purchase, marketing, personnel, material etc.
3. Know different acts for execution of factory work.
4. Understand principles of Bookkeeping & accountancy.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Business Organizations : 1.1 Types & their foundations, proprietary, partnership, private and public limited companies, co-operative and public sector organizations. Role of public and private sector in the country and their social obligations towards society. 1.2 Principles of organizations, delegation of authority and responsibility, decentralization, committee. Types of organizations such as line/military, staff, line & staff. 1.3 Marketing Management: Definition, Selling V/s Marketing concept, Functions of Marketing management, Market Research, Definition, functions & agencies of advertising, Types of market. | 9 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | Human Resource Management : 2.1 Personnel management: Duties and responsibilities of personnel management, Manpower planning, Sources of employment, recruitment, selection. Various methods of testing, training and development of workers and supervisors, duties and authorities of supervisors, morale maintenance, motivation. 2.2 Wages and Incentives: Definition of wages, wage payment plans, Concept of incentive. 2.3 Safety management: Causes and effects of accident, Safety programmes. 2.4 Labour Laws: Factory act, Employee's State Insurance act, Workmen's Compensation act, Dispute act. | 9 | 16 |
| 3 | Material and Stores Management : 3.1 Introduction to the functions of material management, material flow in an industry, purchase functions and systems, purchase procedure. Receipt and Issue of material, Types of stores, centralized & decentralized purchase. 3.2 Inventory Control: Objectives of inventory control, inventory and its classification, EOQ (Economic Order Quantity) its derivation (no numericals), ABC analysis, Material Requirement Planning (MRP). | 7 | 12 |
| 4 | Management Process: 4.1 Management and its various definitions, Importance of management, Difference between management, organisation and administration, Evolution and development of management, Levels of management scientific management. 4.2 Principles of management (14 principles of Henry Fayol). 4.3 Functions of management such as planning, organising, directing, controlling, etc. | 6 | 12 |
| 5 | Financial Management: 5.1 Objectives & Functions of Financial management. 5.2 Capital Generation & its Types, Finance (methods of raising capital), Finance from Bank, Capital market, Financial institutions, Shares & its types, Debentures, Loans, Financial Ratios. | 9 | 16 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | 5.3 Book Keeping & Accountancy, its objectives, principles of double entry book keeping, Accounting Terminology (Numericals only on Journal & Ledger Account). 5.4 Introduction to Trading account, profit and loss account & Balance Sheet (No Numericals). | | |
| 6 | Project Management and Quality Management: 6.1 CPM/PERT Technique: CPM terminologies, Definitions in PERT, Comparison of CPM & PERT (No Numericals). 6.2 Quality management, Quality Policy, Quality control, Inspection, Concept of Quality circle, TQM, Quality Audit. | 8 | 12 |

Teaching Methodology: Chalk-Board, Discussions, Transparencies.

Skills to be developed:

Intellectual Skills :

- Understand functions and managerial skills required for various departments.
- Understand the principles of double entry book keeping system.
- Interpret transactions in journal, ledger and balance sheet.

Learning Resources:

Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------------------------------|--|---------------------|
| 1 | Dr. O.P. Khanna | Industrial Engineering & Management | Dhanpat Rai & Sons. |
| 2 | J. R. Batliboi | First Steps in Book Keeping | |
| 3 | Dr. B. C. Punmia and K. K. Khandelwal | Project Planning and Control with CPM and PERT | Laxmi Publication. |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Instrumentation Course Code : R10EE 2301
Course Category : Allied Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 50 | 150 |

Rationale :

An electrical engineer has to deal with various types of instruments to measure various quantities like temperature, pressure etc. In this course the student will learn about operating principle, construction, operation, application & selection of various types of instruments used in Industries.

Objectives :

The students will be able to

1. Understand the principle of instrumentation system & its characteristics.
2. Understand the construction & operation of various types of recorders.
3. Understand the principle of operation & construction of instruments required to measure the vibrations, temperature, pressure, flow, liquid level.
4. Understand the principle & methods of Non Destructive Testing (NDT) in industry.
5. Know about the principle & operation of commonly used biomedical instruments like Blood Pressure apparatus, Electrocardiogram.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | <p>1.1 Characteristics of Instrumentations: Generalized Instrumentation system. Elements used for each stage & their functions. Types of Errors and Calibration and permissible limits of errors. Calibration report for instruments & its interpretation</p> <p>1.2 Transducers: properties & types – Active, Passive Transducers. Characteristics of transducers. 1.3 Factors to be considered in selection of an instrument. Comparison of Electrical & Mechanical Instruments.</p> <p>1.3 Factors to be Considered in selection of an instrument. Comparison of Electrical & Mechanical Instruments.</p> <p>1.4 Indicators & Recorders- Types & operation.</p> | 9 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 Temperature measurements: Temperature scales, Temperature measurement by bimetallic & expansion thermometers. Thermister,</p> <p>2.2 RTD & Thermocouples: Types, Characteristics, measuring circuits, temperature ranges. Pyrometer- Types, construction & applications. Temperature measurements by Infrared Camera.</p> <p>2.3 Vibration Measurements- Causes & effects of vibration. Various methods of vibration measurements</p> | 12 | 16 |
| 3 | <p>3.1 Pressure Measurement: Units of pressure measurements, pressure measurement by Bourdon Tube pressure gauge. Elastic Elements of pressure measurements. Various types of manometers. Various types of manometers. Aneroid & Fortein's barometer, Inverted bell instrument.</p> <p>3.2 Instruments to measure very high & very low pressure. Dead weight tester.</p> <p>3.3 Electrical conductivity measurements.</p> | 9 | 12 |
| 4 | <p>4.1 Flow Measurement : Positive displacement Meters - 'D' Slide valve, sliding Vane, Nutating disc,</p> <p>4.2 Head meters, Variable area meter, Electromagnetic, Ultrasonic, Vortex & Drag type flow meter, hot-wire anemometer, Weirs.</p> <p>4.3 Acceleration measurement: Acceleration indicators, accelerometers, Seismic Instruments.</p> | 9 | 12 |
| 5 | <p>5.1 Radioactive isotopes: types of radiation & their properties. Instruments to detect radio activity .Industrial applications of radio isotopes for various measurements</p> <p>5.2 Biomedical Instrumentation- B P Apparatus, Electrocardiogram, Endoscope.(Theory should be coverd in Practicals/ No questions in Theory Paper.)</p> <p>5.3 Displacement measurements- various methods, LVDT Construction and Operation and LVDT as a generalized transducer for other measurements, RVDT.</p> | 12 | 16 |
| 6 | <p>6.1 Liquid level measurements-Using floats, electrical & other methods</p> <p>6.2 Non -destructive testing- Advantages, Methods used – Magnetic Particle, Ultrasonic, Eddy Current and X-Ray Testing.</p> <p>6.3 Signal Conditioning – Concept of Signal Conditioning and Block diagram of Signal Conditioning System And its Working.</p> | 9 | 12 |

Teaching Methodology : Chalkboard, Discussion, Power Point Presentation, Charts.

Term Work :

Skills to be developed :

i) Intellectual Skills :

- Identify various types of instruments for various applications
- Select proper type of instrument to measure a particular quantity
- Interpret the results indicated by the instruments
- Understand the construction & operation of various instruments

ii) Motor Skills :

- Connecting the instrument as per given diagram
- Measure various quantities on various meters
- Draw Graph of quantities indicated by meters
- Observe the Results and Compare

List of Practicals :

Term work shall consist of any twelve experiments of the following.

1. Calibration of bimetallic thermometer
2. Calibration of expansion thermometer
3. To plot the characteristics of a RTD
4. To plot the characteristics of a thermocouple
5. To plot the characteristics of a Thermister
6. Study of Strip / Circular chart Recorder
7. Measurement of pressure using Bourdon tube pressure gauge
8. Measurement of pressure using Mercury Manometer
9. Liquid level measurement using capacitor method
10. Study of strain gauge
11. Study of Rota meter
12. Study of Domestic Water Meter
13. Study Pitot Tube
14. Measurement of Displacement using LVDT
15. Study of B.P. apparatus

Professional Practices:

1. Students have to Visit a calibration facility for calibrating various types of Instruments and prepare a report of this visit.
2. The students have to collect Manufacturers literature / Brochures of any one type of Instruments used for Measurement of Pressure / Temperature / Liquid Level / Biomedical and prepare the comparison Chart pertaining to their specifications.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Learning Resources :

A)Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-----------------|---|---------------------|
| 1 | Jones | Instrument Technology Vol.1,2,3 | Pitman Publications |
| 2 | Beckwith & Buck | Mechanical Measurements | John Wiley Intr. |
| 3 | R.K.Jain | Mechanical Measurements & Instrumentation | S.Chand & Co. |
| 4 | A.K.Sawhney | Electrical Measurements and Instrumentation | Dhanpat Rai and Co. |

B) Web sites :

1. www.omega.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Basic Electronics

Course Code : R10EX 2501

Course Category : Allied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 25 | 125 |

Rationale :

A diploma holder in Electrical Engineering has to deal with Electronic components while controlling the Electrical systems & as equipments. In this course the student learn about the basics, working, construction of the various components of Electronics such as SCR, BJT, UJT, amplifiers, oscillators.

Objectives:

The students will be able to

1. Understand the Semiconductor devices Diode, Transistor.
2. Understand voltage amplifier.
3. Describe Small signal amplifiers and Large signal amplifiers.
4. Know concepts and types regulated power supply.
5. Know working principles of photo devices.
6. Understand Effect of feedback on amplifiers performance.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Semiconductor devices. 1.1 Constructional features, working & characteristics of the junction diode & Zener diode. Their rating & uses. 1.2 Constructional features & working of PNP, NPN BJTs in the grounded base & grounded emitter configuration. BJT rating. Comparison of 3 configurations. Alfa & beta, cutoff frequencies. Mechanism of flow of current in the BJT's & diode. 1.3 Constructional features, working, characteristics of JFET, MOS, UJT, DIAC, SCR, Photo diode, Photo transistor, Photo tube, vacuum & gas filled types. | 12 | 16 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 2 | Small signal amplifiers. 2.1 BJT as amplifiers, different biasing methods. Load line, types of distortion in the amplifiers. 2.2 Multistage amplifiers. RC coupled LC coupled. Transformer coupled & tuned amplifier, their frequency response curves, analysis of curves, and bandwidth of the amplifier. 2.3 Calculation of the voltage gain of an amplifier (using simple method). | 10 | 12 |
| 3 | Large signal amplifiers 3.1 Classification of amplifiers on the basis of voltage & power amplification. 3.2 Power amplification circuit & its working. Class A, Class B, Class AB, and Class C, Push pull amplifiers: Working, advantages, disadvantages. 3.3 Transistor phase inverter. Complementary symmetry push pulls amplifier- working, advantages, disadvantages. Emitter coupled dc differential amplifier. | 10 | 12 |
| 4 | 4.1 -Darlington amplifier - circuit & working. Thermal working & collector dissipation & heat sink. 4.2 Power supply - Junction diode as half wave, full wave & bridge rectifier circuits & operation. 4.3 Filters - inductors, shunt capacitor, L type – their working, advantages, Disadvantages. Simple calculation of output voltage, PIV, ripples frequency, rating of diodes to be used in above circuit. | 12 | 16 |
| 5 | 5.1 Zener regulated power supply- working & simple calculations. Voltage doublers & multiplier circuits & their working. 5.2 Oscillators- Advantages & uses. LC oscillators, block diagram & its working. Criterion for sustained oscillations. Hartley, Colpitts, tuned & crystal oscillator circuits & working. 5.4 Electronic emissions- Methods of emission, practical emitters. Construction & operation of CRO, method of deflection. | 10 | 12 |
| 6 | 6.1 Photovoltaic cells - Triac, Photomultiplier, optocoupler with uses. Detector – Idea & necessity of modulation, diode as detector; circuits & operation. 6.2 Feedback amplifiers - Introduction, positive & negative type of feedback. Effect of feedback on amplifiers performance, its advantages. Simple calculations on negative feedback. | 10 | 12 |

Teaching Methodology: Chalk-Board, Discussion, Power Point Presentation, Transparency, Expert Lectures.

A) Term Work:

Skills to be developed:

i) Intellectual Skills :

- Understand the construction & operation of various semiconductor device
- Identify the uses of the various electronic components
- Understand the working of the electronic equipments Amplifier, CRO, Power Supply, Photovoltaic cell

ii) Motor Skills :

- Proper connection of the components as per circuit diagram
- Measurement of the readings of the parameters
- To plot the graphs as per the readings taken

List of Experiments/ Practicals / Assignments :

1. Study & characteristics plotting of junction diodes.
2. Plotting input & output characteristics of BJT in ground emitter configuration.
3. Plotting input & output characteristics of BJT in ground base configuration.
4. Characteristics of a phototransistor.
5. Determination of electrostatic & electromagnetic deflection sensitivity of CRT.
6. Determination of anode characteristics of SCR.
7. Study of single stage transistor amplifier, measurement of its gain & plotting of its frequency response curve.
8. Building of half wave, full wave & bridge rectifier circuit with shunt capacitor & determination of their regulation characteristics.
9. Designing a Zener regulated power supply & determination of its regulation characteristics.
10. Tracing & calibration of oscillator
11. Emitter coupled differential amplifier – study of its operation for common mode & differential mode.
12. Building of half wave, full wave & bridge rectifier circuit without shunt capacitor & determination of their regulation characteristics.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Learning Resources:

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------|---------------------------------------|------------------------------------|
| 1 | Millman & Halkies | Elements of Electronics. | Prentice Hall of India, New Delhi. |
| 2 | V.K.Mehta | Principles of Electronics. | S. Chand & Co. New Delhi |
| 3 | B.L.Theraja | Electrical Technology. (Volume IV) | S. Chand & Co. New Delhi. |

B) Magazines:

- Electronics for you.
- Digital world)

C) Web sites for references:

- www.en.wikipedia.org
- www.electronics-tutorials.com
- www.indianscientificinstrument.com
- www.alldatasheet.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Total Quality Management Course Code : R10ME5208

Course Category : Allied Credits : 4

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|-----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 2 | - | - | - | - | 50@ | 50 | 100 |

@ Internal Examination

Rationale:

Indian organizations are facing a challenge from the inflow of MNCs ever since the Government implemented the policies of liberisation, privatization & globalization. In the light of this, there is a dire need of new ideas, approaches and techniques for attaining a competitive edge. The course aims at exposing various aspects of TQM like cost of quality, QC tools, Kaizen, quality circles, team work for quality, customer satisfaction, benchmarking, quality culture, quality standards and quality audit.

Objectives:

The students will be able to

1. Know about detail clauses of ISO 9000:2000 series
2. Know about the TQMEX model, Japanese 5 – S practice, Deming cycle, Juran's trilogy, Kaizen etc.
3. Understand the concept of six sigma, total waste elimination, incoming material control.
4. Know old as well as new tool for quality improvement.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | ISO 9000 : System, Management system, Quality management system, What is ISO 9000 series of standards? Structure, scope and approach of ISO 9000 (2000) series standards, 8 Quality management principles. ISO 9000:2000, Types of audit, Benefits and stages of Audits. Advantages and disadvantages of ISO 9000. Registration of ISO 9000, Validity of registration, Organizing the documentation. ISO 9001: ISO 9001:2000, Quality management systems – Requirements for quality assurance, Advantages of ISO 9001 (2000) , Reversed ISO 9001:2000 standard characteristic, Comparison of ISO 9001 (2000) and ISO 9001 (1994). Ten tips of moving to ISO 9001 (2000). ISO 14000 & ISO14001, Comparison of ISO14000 and ISO 9000, Why ISO 14001. | 6 | - |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>TQM : TQM – Definition, Aim, and guide line principles, salient features. Difference between ISO & TQM. The TQMEX model, Japanese 5-S practice, 5 pillars of TQM, Core concept of TQM- Quality for profit, Right first time. Acceptance Quality Level. Quality Gurus: Philip crossby, A.V. Feigenbaum, Ishikawa, Shigeo shingo, Deming's 14 point methodology, Juran's quality trilogy.</p> <p>Kaizen : Concept of Kaizen, Kaizen v/s innovation, Kaizen and management process oriented and result oriented management. Company wide quality control (CWQC). Kaizen the practice. Deming cycle- PPCA cycle, PDCA cycle, SDCA cycle, Quality Control Circles. Types of Kaizen- Management, Group and Induction Oriented.</p> | 6 | - |
| 3 | <p>Six Sigma: Introduction, concept, Quality approaches models, Belts in six sigma, six sigma cost and savings, eliminate waste (DMAIC), six sigma in manufacturing and six sigma in service industry. Zero defect programme. Quality Challenge facing Industry, Total Quality & Internationalism, Role of Govt. 9 M's affecting Quality. 4 Jobs of Quality Control. Role of Statistics in QC.</p> | 4 | - |
| 4 | <p>Quality of Product Design and Development: Introduction, quality of design, Product development, FMEA, FMECA. Tools for Quality Improvement : Quality improvement, Methods of quality improvement, Break through sequence, Tally sheet, Graphs, Histograms, stratification, Scatter diagram, Pareto diagram, frequency distribution, flow chart, Brainstorming, 5 W & 1 H. New Q. Tools : Flow diagrams, Flow chart, Cause and effect diagram, Relations diagram, Tree diagram, Matrix flow diagram, Matrix data analysis diagram, Arrow diagram, Applications of new tools.</p> | 6 | - |
| 5 | <p>Incoming Material Control : Need, Principles of vendor relations in Quality, Pattern for incoming material control routine: - Purchase analysis, Vendor selection & order placement. Material receipt & material examination, material disposal. Vendor relations, Vendor ratings and Vendor quality ratings.</p> <p>Control Charts & Acceptance Sampling : Use of X & R chart, p chart. np Chart, c Chart for Quality Control. Sampling inspection, OC curve and terms in OC curve, uses of OC curve, IS 2500 for selection of sampling plans.</p> | 4 | - |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 6 | Total waste Elimination: What is waste? Classes of wastages, Sources of waste, Waste identification, Steps of waste elimination, TWE methods. Achieving Total Commitment to Quality : Introduction, Total commitment to quality, Activities for achieving total commitment to quality, Quality education and training for total commitment to quality, Quality mindedness, Participative approaches for total commitment to quality, Other key approaches, Communication, motivation for development of TQM. | 6 | - |

Teaching Methodology: Discussions, Chalk-Board, Transparencies.

Term Work: Skills to be developed:

i) Intellectual Skills :

- Understand TQM Methodolgy.
- Report writing on ISO 9000, ISO 9001.
- Enhance learning to learn skills.

ii) Motor Skills :

- Preparation of power point presentation / Transperancies.

Assignments:

Twelve assignments consisting of at least one on each topic are to be completed

Professional Practices:

At least two topics from the syllabus have to be selected by group of student and they are supposed to give seminar / presentation.

One visit to a relevant industry and student will submit a report of the visit as a part of term work

Learning Resources : Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------------|-----------------------------|---|
| 1 | Dr. K. C. Arora | Total Quality Management | S.K. Kataria & Sons Pub., New Delhi. |
| 2 | Juran and Gryna | Quality Planning & Analysis | Tata McGraw Hill Publications, New Delhi. |
| 3 | Tapan P. Bagchi | ISO 9000 | Wheeler Publications. |
| 4 | R.K. Jain | Engineering Metrology | Khanna Publications, New Delhi. |
| 5 | Poornima M. Charantimath | Total Quality Management | Pearson Education Pub., New Delhi. |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Marketing Management

Course Code : R10EE 2303

Course Category : Allied

Credits : 04

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|-----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 2 | - | - | - | - | 50@ | 50 | 100 |

Rationale :

An engineer of any branch may be required to deal with marketing activity related with his field. This course covers the basic techniques used in the marketing management generally related with any field of application

Objectives :

The students will be able to

1. To know the principles of market research & analysis
2. To know about the organization of marketing department & marketing network.
3. To know about the aspects of international marketing.
4. To undertake a small market survey

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Introduction- Marketing Management, process & functions. Developing marketing strategies. Marketing environment | 7 | - |
| 2 | 2.1 Market Research & Sales forecasting- Need of market research, Methods of data collection, sales forecasting, consumer behavior, Case Study | 8 | - |
| 3 | 3.1 Market Planning- market positioning, market targeting, marketing strategy, product policy, branding, pricing & pricing strategy, Advertising. | 8 | - |
| 4 | 4.1 Sales management- Setting objectives & deciding policies, development of sales force, sales organization 4.2 International marketing- Liberalization, need of International Marketing, International marketing process & Exim policy of Govt. of India, Case Study. | 9 | - |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Teaching Methodology : Group Discussion, Visits, Guest Lectures

Term Work :

Skills to be developed :

i) Intellectual Skills :

- Identify the functions & processes of marketing
- Selection of suitable method of marketing
- Interpretation the data collected
- Understanding the consumer requirement
- Report writing about the market survey conducted

A group of 4 to 5 students have to complete the following assignments

1. Select an existing /hypothetical product related with their discipline
2. Carry any market survey by preparing suitable questionnaire.
3. Prepare a marketing plan indicating the advertising, price strategy & sales promotion techniques.
4. Prepare & submit the report of above activities.

The internal oral examination will be conducted on the above report.

Reference:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-----------------|------------------------------------|--|
| 1 | Kotler | Marketing Management | (11 th Edition), Pearson Education India. |
| 2 | Dr. V.O. Vorkey | A Handbook on Marketing Management | Everest Publishers, Pune |
| 3 | Dr. S. L. Gupta | Elements of Marketing Management | Everest Publishers, Pune |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Entrepreneurship Development Course Code : R10ME2205

Course Category : Allied Credits : 4

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 2 | - | - | - | - | 50 | 50 | 100 |

Rationale:

This course consists of topics related to the development of entrepreneurial skills and other details such as selection of product lines, site selection, financial aspects, personnel management, quality control and creative thinking. The course includes case studies in the related field. The course emphasizes the development of enterprising qualities among young engineers.

Objectives :

The students will be able to

1. Identify entrepreneurship opportunity.
2. Acquire entrepreneurial values and attitude.
3. Use the information to prepare project report for business venture.
4. Develop awareness about enterprise management.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | <p>1.1 Introduction : Definition of entrepreneur, concept of entrepreneur and entrepreneurship, importance of entrepreneur. Types of entrepreneur: Innovating entrepreneur, imitative entrepreneur, fabian entrepreneur, drone entrepreneur and according to type of business. Difference between Entrepreneur and Intrapreneur.</p> <p>1.2 Entrepreneurial Competencies: - Characteristics of an entrepreneur, qualities of an entrepreneur, competencies of entrepreneur.</p> <p>1.3 Women Entrepreneur: Definition, characteristics of women entrepreneur. Causes of limited growth in India, remedies for limited women entrepreneurship development.</p> | 6 | - |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 2 | <p>Motivation : Definition and concept of motivation, types of motivation: affiliation, power, and achievement motivation. Need and importance of achievement motivation, challenges of motivation, Motivating factors. Theories of motivation: a) Maslow Hierarchy theory ,b)Mc Gregor X-Y theory, c) Hygiene Factor theory.</p> | 4 | - |
| 3 | <p>Creativity and Innovation : Definition and concept of Innovation, definition and concept of Creativity. Characteristics of creative people. Discussion of various examples with respect to creativity and innovation.</p> | 5 | - |
| 4 | <p>4.1 Business Opportunity Search and Scanning : Opportunities available in different sectors such as manufacturing, services and trading. Classification of opportunities on the following: - Natural resource based, Demand based, Local industrial based, Service sector based, Export based, Skill based, Off-farm based.</p> <p>4.2 Business Idea : Search for business idea, sources of business idea, ways of generating ideas, ideas processing & selection (factors affecting product idea).SWOT Analysis.</p> <p>4.3 Sources of Business Idea : Market survey & techniques, prospective consumers, development in other nation, study of project profile, government organization, trade fair and exhibitions. Checklists for information collection.</p> | 6 | - |
| 5 | <p>Government and Non Government Agencies for Promotion and Development : Importance of funds, Types of funds. Various schemes of assistance of government, Government policies and incentives. Registration with various government agencies, definition of SSI and Ancillary.</p> | 5 | - |
| 6 | <p>Business Plan Preparation : Project identification, project formulation, feasibility analysis, Estimation of cost of production, Cost volume profit relationship at different levels, Interpretation of financial statements, Institutionalized and Non-institutionalized sources of working capital, Funds flow statements, Loan application form for appraisal. Project report preparation.</p> | 6 | - |

Teaching Methodology: Group Discussion, visits, guest lectures.

Term Work:

Skills to be developed :

I) Intellectual Skills:

- Identify various opportunities in market.
- Identify individual's entrepreneurial competencies.
- Interpret risk to be taken during a task.
- Interpret SWOT of individual.
- Prepare a report of business plan.
- Enhance/Improve presentation and writing skills.

List of Experiments / Practicals / Assignments:

1. Biography of any entrepreneur.
2. Self Disclosure Exercise (Who am I?).
3. Self rating questionnaire.
4. Thematic Appreciation Test (TAT).
5. Ring Toss Exercise.
6. Tower Building Exercise.
7. Convince and Crown.
8. Creativity and Problem solving.

Professional Practices:-

1. Walking through Market.
2. Business plan preparation.
3. Interview of a successful entrepreneur.
4. Interview / Biography of a successful women entrepreneur.

Learning Resources :

Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|------------------|---|--|
| 1 | Vasant Desai | Dynamics of Entrepreneurial Development and Management. | Himalaya Publishing House, 1997, Reprint-1999. |
| 2 | Dilip M. Sarwate | Entrepreneurial Development Concept and Practices. | Everest Publishing House, 1996. |
| 3 | Gupta Srinivasan | Entrepreneurial Development. | Sultan Chand & Sons, 1993. |
| 4 | D. D. Mali | Training of Entrepreneurship and Self Employment. | Mittal Publications, 1999. |

DIPLOMA PROGRAMME : MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Advanced Mathematics

Course Code : R10SC2701

Course Category : Allied

Credits : 4

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | - | 3 | 80 | 20 | - | - | - | 100 |

Rationale:

Mathematics is the backbone of all technical courses. Understanding the engineering concepts requires logical approach and thinking. The course aims to give the Diploma students a perfect knowledge of Mathematics which can be used in the engineering field. They will be able to apply the advanced concepts of Mathematics in solving the varied kinds of engineering problems.

Objectives :

The students will be able to

1. Learn the new concepts of Integration, Laplace transform, Probability and differential equations
2. Solve the given mathematical problem with intelligent combination of techniques
3. Apply the laws and principles of mathematics to practical situation.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Integration 1.1 Definition of integration as anti-derivative. Integration of algebraic functions. Integration of trigonometric functions. Integration by substitution. 1.2 Different methods of integration. Integration by different types. Some general integral. Integration by parts. Integration by partial fraction . 1.3 Definite integral. Properties of definite integral. | 15 | 16 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | Application of Integration: 2.1 Area under the curve. Area between two curves. 2.2 Volume of solid of revolution. 2.3 Mean value. Root mean square value. | 8 | 12 |
| 3 | Differential Equation: 3.1 Definition of differential equation. Order and degree of differential equation. Formation of differential equation. 3.2 Solution of differential equation of 1st order and 1st degree. Variable separable differential equation. Homogenous differential equation. Linear and reducible to linear form. Exact differential equation. | 10 | 12 |
| 4 | Numerical Methods: Interpolation 4.1 Introduction, Lagrange's Interpolation formula. Newton's forward & backward difference interpolation formulae. Numerical differentiation and integration 4.2 Newton's forward and backward difference formulae for differentiation (1 st and 2 nd order derivative at any point). 4.3 Trapezoidal Rule, Simpson's 1/3 rd Rule for Numerical Integration. | 12 | 16 |
| 5 | Introduction to Laplace Transform: 5.1 Definition of Laplace transform. First shifting theorem. 5.2 Inverse Laplace transform. Properties of inverse Laplace transform. 5.3 Convolution theorem. | 10 | 12 |
| 6 | Probability: 6.1 Definition: event, sample space and probability. Addition theorem for probability. Simple examples on probability. Conditional probability. | 9 | 12 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| | 6.2 Probability Distribution Binomial distribution Poisson distribution Normal distribution | | |

Teaching Methodology: Chalk board, Discussion, Assignments, Printed notes.

Skills to be developed :

i) Intellectual Skills:

- Memorizing skill will be developed after studying the formulae of all the topics.
- Selection skill will be developed after studying the methods of solving problems during selection of appropriate formula.
- Calculation skill will be developed after studying the topic Numerical Methods.
- Logical thinking will be developed after studying the topic Probability.
- Application skill will be developed after studying the topic Application of Integration

Learning Resources :

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------------------|--|--|
| 1 | Peter V. O'Neil | Advanced Engineering Mathematics | Thomson, Canada. |
| 2 | C. F. Gerald, P.O. Wheatley | Applied Numerical Analysis | Pearson Education Pte. Ltd., Singapore. |
| 3 | Joel L.Schiff | The Laplace Transform | Springer Verlag, New York. |
| 4 | Shanti Narayan | Engineering Mathematics vol. I & II | S. Chand & Company, New Delhi. |
| 5 | A.M.Kulkarni | Applied Mathematics | Central Techno Publication, Nagpur. |

B) Web sites for references:

1. www.Wikipedia.com
2. www.Wolfarm.com
3. www.Mathworld.com
4. www.nptel.iitm.ac.in

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Computer Programming

Course Code : R10ME2207

Course Category : Allied

Credits : 04

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|-----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 2 | 2 | - | - | - | 50* | - | 50 | 100 |

*Internal Examination

Rationale:

The course aims at providing exposure to the principles of programming. The student shall be able to write simple algorithms, draw and interpret flow charts and write programs in a high level language like C using sequential, branching & repetitive structures.

Objectives :

The students will be able to

1. Break a given task into subtasks.
2. Enhance logical thinking.
3. Develop 'C' programs for simple applications.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Introduction : Problem definition and analysis, algorithms, flow charts, tracing and dry running of algorithms and flow charts. Introduction to C programming, sample C program, compilation & execution of C program. | 5 | - |
| 2 | 'C' Fundamental : Character set, constants, symbolic constants, identifiers, keywords, data types, variable declarations, types of operators: unary, binary, arithmetic, relational, logical, assignment, conditional etc. Hierarchy of operators, expressions, library functions, Use of input/output functions namely printf (), scanf (), getch (). | 8 | - |
| 3 | Control Statement : Use of control statements: if else, while, do while, for, switch, break, continue, comma operator, goto. Writing, compiling, executing and debugging programs. | 5 | - |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 4 | Array : Introduction to subscripted variables, arrays, defining arrays (one and two dimensional), processing arrays, passing arrays to functions. | 5 | -- |
| 5 | Function : Defining and accessing functions, passing arguments, function prototypes. Storage classes: automatic, external, static variables. | 5 | - |
| 6 | String Handling : String handling, string i/o with gets (), puts (), arrays of strings. Introduction to recursion. | 4 | - |

Teaching Methodology: Chalk-Board, Discussions, Power Point Presentations (PPT)

Term Work :

Skills to be developed :

i) Intellectual Skills:

- Reading of 'C' variables and constants
- Writing a 'C' program.
- Interpretation of 'C' program.
- Understanding of control statements, Array, Pointer, Functions.

ii) Motor Skills :

- Compilation of program in 'C' compiler.
- Execution of program and observe the output.

List of Experiments / Practicals / Assignments :

Term work shall consist of flowcharts, source listing and input/output (minimum one program for each one) of following assignments:

1. A program performing **sequential computations**.
2. A program using **if else** statements.
3. A program using **while** statements.
4. A program using **do while** statements.
5. A program using **for** statements.
6. A program using **break** and **continue** statements.
7. A program using **switch** statements.
8. A program for **input/output formatting** using **scanf** and **printf**.
9. A program using **single dimensional array** e.g. sorting/searching.
10. A program for processing a **2 dimensional array** of integers.
11. A program using **user defined functions**.
12. A program for **string handling**.
13. A program using **recursion**.

Learning Resources :

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|----------------------------|-------------------------------|-----------------------------------|
| 1 | Yashwant Kanitkar | Let us C | BPB publications. |
| 2 | Byron Gottfried | Introduction to C programming | Tata Macgraw Hill Publications. |
| 3 | Denis Richie and Kernighan | Introduction to C programming | Prentice Hall India Publications. |

DIPLOMA PROGRAMME : MECHANICAL ENGINEERING

Course : Electrical Engineering Materials Course Code : R10EE3301

Course Category : Core Credits : 03

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 3 | - | 3 | 80 | 20 | - | - | - | 100 |

Rationale:

An Electrical Engineering diploma passed student learns through this course knowledge of Electrical Engineering Materials for performing various duties such as wiring contractor, installation supervisor, Insulation inspection for installations, equipments, instruments.

Objectives:

The student will able to

1. To know about the classification of materials with respect to their Electrical & Magnetic properties.
2. To know about the characteristics of conducting, magnetic, semi-conducting, insulating materials Examples, & their selection parameters.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Classification: Classification of Materials into conducting, semi conducting & insulating materials with reference to atomic structure, energy band, concept of energy band. 1.2 Special Purpose Materials: Thermo couples, Bimetal, Soldering materials, fuse materials. Applications of special material. | 7 | 12 |
| 2 | 2.1 Conducting Materials: Resistivity and factors affecting resistivity , superconductivity. Low resistivity materials: copper, Aluminium and steel, their general properties as conductor. Temperature coefficient of resistance, Mechanical properties, corrosion, solderability & contact resistance. Choice of copper, Alluminium and steel as conductors for various applications. 2.2 Low Resistivity Materials: Copper alloys- Brass, Bronze (cadmium & beryllium), their practical applications. High resistivity materials: Constantan, Nichrome, Manganin, Carbon, Tungsten & their practical applications. | 10 | 16 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 3 | 3.1 Semi Conducting Materials: Conduction in semi-conductors, Energy level bands for semi-conductors. Crystal and Co-valent bonds. P-type, N-type semiconductors, fabrication process for P-N junction diode, P-N-P transistor and N-P-N transistor. Applications of semi conductors, Materials used as semi-conductors. | 7 | 12 |
| 4 | 4.1 Insulating Materials: Electrical Properties: volume resistivity, surface resistance, dielectric loss, dielectric constant. Concept of Breakdown Voltage. Strength of an Insulating Material & Methods to determine it. 4.2 Physical properties: compressive strength, abrasive resistance. Thermal properties: Heat resistance, classification according to permissible temperature rise, effect of overheating on the life of electrical insulation. Increase in rating with the use of insulating materials having higher thermal stability. 4.3 Chemical properties: Solubility, Chemical resistance, Flash point. | 9 | 16 |
| 5 | 5.1 Plastic Insulating Materials: Definition & classification, Thermo setting materials (phenol formaldehyde, amino resin and epoxy resins.), their properties and application. Thermo plastic materials (polyvinyl chloride, PVC, polythene), their properties and applications. Fiber glass reinforced plastic. 5.2 Natural Insulating Materials: Mica and mica products. Asbestos and asbestos products. Ceramic materials, glass and glass products. Cotton, silk, jute, paper (dry and impregnated), Prespahn and Latheroid , rubber , bitumen , insulating oil, insulating varnishes, enamel, their properties & applications. 5.3 Gaseous Material: Air, Hydrogen, SF6 their properties & applications. | 8 | 12 |
| 6 | 6.1 Magnetic Materials: Ferromagnetic materials: High silicon alloy steel and low silicon alloy steel, cold rolled grain oriented and non oriented steel, Nickel iron alloy, soft ferrites their properties & applications. 6.2 Hard Magnetic Materials: Tungsten steel, chrome steel, cobalt steel , Alnico, Hard ferrites their properties & application. | 7 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Skill to be developed:

i) Intellectual Skills:

- Understanding - the properties of the conducting, semiconducting, insulating & magnetic materials
- Selecting proper electrical material for proper application.

Professional Practice:

Demonstration of Breakdown of Solid/ Liquid Insulating Material by arranging the Educational Visit in Industry or at Institute

Reference Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------------|----------------------------------|----------------------|
| 1 | Raina, Bhattacharya | Electrical Engineering Materials | TTTI, Bhopal |
| 2 | N. Appagalam | Electrical Engineering Materials | McGraw Hill Co., IND |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : MECHANICAL ENGINEERING

Course : Mechanical Engineering

Course Code : R10ME 3302

Course Category : Core

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | TU | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 50 | 150 |

Rationale :

It is expected that the Diploma holder in Electrical Engineering have to deal with number of mechanical equipments in industry from the various aspects like operation, maintenance etc. Though their branch being Electrical, they must have adequate knowledge of Mechanical Engineering. In this course he will learn about the basics of I C Engines, Heat treatments, forces, hydraulics, pneumatics

Objectives :

The students will be able to

1. Understand the concepts of shear forces , bending moment torsion,
2. Know about various mechanical properties of materials
3. Know about composition & properties of commonly used metals & alloys.
4. Know about testing methods of to determine the mechanical properties
5. Know about the basic principles of hydraulics, hydrostatics, fluid flow.
6. Understand the construction & working of water turbines, venturimeter.
7. Understand the concept of pressure.
8. Understand the principle of heat transfer, powder metallurgy & power transmission.
9. Know about the construction & working of I C Engine& its characteristics
10. Know about the various welding methods in industries.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Shear Force & Bending Moment- Shear force calculation, cantilever, simply supported beam, concentrated load & uniform load, bending moment, maximum bending moment and moment of inertia. Torsion: Twisting of solid & hollow shafts, tensional rigidity power, and torque. | 12 | 16 |
| 2 | 2.1 Mechanical Properties of Materials – Elasticity, ductility, malleability, brittleness, toughness, hardness, formability & weld ability. | 10 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | <p>2.2 Testing of Materials-Destructive, non-destructive testing, tensile, compressive, fatigue, impact & hardness test, magnetic crack detection, ultrasonic, radiographic tests. Stress-strain curve, elastic limit, Hook's law, Young's modulus, thermal stress.</p> <p>2.3 Materials- Classification of plain carbon steel, nickel chrome, tungsten & silicon steel. Copper- properties & applications fabrication. Brass properties, Mu-metal, naval & silicon brass. Bronze properties. Al- alloys.</p> | | |
| 3 | <p>3.1 Hydrostatics: Properties of gases & liquids, related terms, calculation of pressure head, its conversion to height of water column. Definition of center of pressure, Concept of center of pressure. Hydraulics: Bernoulli's theorem, its application in the venturimeter. Calculation of c.c. cv, cd flow through notches, water turbine.</p> <p>3.2 Pressure – vacuum & absolute pressure.</p> | 10 | 12 |
| 4 | <p>4.1 Heat Treatment: Electrical conductors, annealing of steels, its effect on mechanical & electrical properties, comparison between annealing, normalizing, hardening, tempering.</p> <p>4.2 Powder Metallurgy: Importance & limitations, processes, electrical applications</p> <p>4.3 Power Transmission & Safety: Belt, rope, chain gear drives, tools, safety of personnel in the workshop.</p> | 12 | 16 |
| 5 | <p>5.1 Internal Combustion Engines & Turbines: Air standard efficiency of diesel & Otto cycle. Calculation of IHP & BHP, heat balance sheet, use of I C Engines for power generation.</p> <p>5.2 I C Engines: Construction & classification of I C Engines. Difference between two stroke & four stroke, petrol & diesel Engine. Operation of Diesel Engines, maintenance & faults.</p> | 10 | 12 |
| 6 | <p>6.1 Fundamentals of Fluid Flow: Discharge, types of flow, and equation of continuity Orifices</p> <p>6.2 Introduction to Industrial Hydraulics & Pneumatic Systems: Various components used, their functions, simple pneumatic & hydraulic circuits.</p> <p>6.3 Types of Welding: fusion & pressure welding: electric resistance welding, Arc welding, gas welding.</p> | 10 | 12 |

Term Work :

Skills to be developed:

i) Intellectual Skills :

- Understanding the concept of shear moment, bending moment, torsion, elastic limit, pressure.
- Understanding the principles, construction & operation of IC Engines, Hydraulic machines, welding equipments, the power transmission components.
- Understanding various methods of testing of materials.
- Interpretation of simple pneumatic & hydraulic circuits.
- Identification of various heat treatment processes.

ii) Motor Skills:

- Proper connection.
- Measurement of various parameters of IC Engines.
- Troubleshooting.
- Testing.
- Draw the graph from the observations & Interpret the results.
- Connecting Simple pneumatic & hydraulic circuits.

List of Practical/ Experiments / Practicals / Assignments:

1. Study of diesel engine.
2. Study of petrol engine.
3. Trial on diesel engine.
4. Study of pressure measuring devices.
5. Study of venturimeter.
6. Study of orificemeter.
7. Study of industrial hydraulic components.
8. Study of industrial pneumatic components.
9. Study of hydraulic and pneumatic circuits.
10. Study of fusion and pressure welding.
11. Study of pelton wheel.
12. Hardness testing of materials.

Learning Resources :

A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|------------------|-------------------------------|---------------------------------|
| 1 | O.P. Khanna | Material Science & Metallurgy | Dhanapat & Co., New Delhi. |
| 2 | V.D. Kodgire | Material Science & Metallurgy | Everest Publications, Pune. |
| 3 | R. K. Bansal | Fluid Mechanics | Khanna Publications, New Delhi. |
| 4 | Ramamrthumm | Strength of Materials | New Delhi Dhanapat & Co. |
| 5 | Hajara Choudhari | Workshop Technology Vol. I | Media Promoters and Publishers. |

B) Web sites for references:

1. www.howstuffworks.com

DIPLOMA PROGRAMME : MECHANICAL ENGINEERING

Course : Electrical Engineering Skills & Drawing Course Code : R10EE 3303

Course Category : Core Credits : 04

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|-----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| - | 4 | - | - | - | - | 25@ | 50 | 75 |

Rationale :

A student has to complete the following assignments so as to acquire some of the basic skills in Electrical work required in laboratory or in the industry. He is required to understand and interpret the drawing prepared by others.

Objectives :

The students will be able to

1. Connect the various meters as per the laws & convention of the electrical engineering.
2. Suggest the meter, equipment, accessories for the connections as per requirement.
3. Identify the equipment, meter rating, machine rating, & choose correct meter for use.
4. Identify the symbols used in India in Electrical Engineering as per IS.
5. Draw & explain the power & lighting Circuit.

Term Work :

Skills to be developed :

i) Intellectual Skills :

- Identify various types of instruments for various applications
- Discriminate the connection type
- Selection of proper instrument for a particular quantity
- Interpretation the results indicated by the instruments
- Understanding the correct methods of connections & the drawing the symbols
- Reading the drawing

ii) Motor Skills:

- Proper connecting method is expected
- Reading the meter reading

Part I: Electrical Engineering Skills

Any Twelve Assignment

1. Connecting D.C./A.C. ammeter & voltmeter as per circuit diagram.
2. Connecting wattmeter & energy meter as per circuit diagram & calculation of their multiplying factor.
3. Connecting single-phase transformer.
4. Connecting A.C./ D.C. motors.
5. Connecting a rheostat as Potential Dividers & as a variable resistance.
6. Connecting a frequency meter & power factor meter.
7. Study of types of wires & terminations by lugs & connectors.
8. Connecting Cable glands and understand its Importance.
9. Wire jointing & soldering technique.
10. Use of Digital Multimeter, standard wire gauge and wire stripper.
11. Use of megger, tong tester & earth tester.
12. Study of different tools in wiring.
13. Study of Cables, Cable Terminations & jointing.

Part II: Electrical Engineering Drawing

The term work shall consist of the following three drawing sheets of A2 size.

1. Symbols as per IS 732 for wiring, machines & power system components & any two circuit diagrams using these symbols.
2. Panel wiring diagrams of any two panels (Battery charger, domestic meter, pumps controller or similar type).

Professional Practice:

Visit to a location for Observing the Procedure for Cable jointing OR Showing Video/ Slides on Cable Termination and Jointing

Learning Recourses:

Website: WWW.klntools.com

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Basic Electrical Engineering Course Code : R10EE 3304

Course Category : Core Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | |
|-----------------|----|-----------|--------------------|------|-----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | 50@ | - | 50 | 200 |

Rationale:

It is intended to teach the students facts, concepts & principals of electricity so that students will be able to apply the same for solving simple electric and magnetic circuits. He can also apply these principals in electric power generation, transmission, distribution, utilization, manufacturing and installation systems.

Objectives:

The students will be able to

1. Understand the basic concepts in electrical engineering
2. Know the concept of electromagnetism & electromagnetic induction
3. Know the concepts of electrostatics
4. Know the concept of alternating & direct current systems various phenomenon involved in it.
5. Calculate various electrical quantities by applying these concepts.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Basic Electricity: Revision of Concept of current, potential difference, concept of resistivity, Resistance, Ohm's law, effect of temperature on the resistance, (Numerical). 1.2 Electric power & energy, their units, relationship between electrical, mechanical & thermal units of work, power & energy (Numerical). 1.3 Applications of Ohm's law, Series Parallel connections of resistances (Numerical). | 10 | 12 |
| 2 | 2.1 Magnetism Concept of magnetic circuit, flux, reluctance, MMF, permeance, permeability, flux density, analogy between magnetic & electric circuits 2.2 Electromagnetism: Magnetic effect of Electric Current, B-H Curve, Cycle of Magnetization, Hysteresis Loss, Magnetic Series and Parallel Circuit (Numerical). | 9 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 3 | 3.1 Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, Fleming's Left hand Rule and Right hand Rule, Magnetic fields produced by current carrying straight conductors & solenoid. 3.2 Self-inductance, mutual inductance, energy stored in the magnetic field, eddy current loss, Force between two parallel current carrying conductors, (Numerical). | 13 | 16 |
| 4 | 4.1 Electrostatics: Laws of electrostatics, unit of charge, electric field, electric field intensity, electric flux density, electric potential, equi-potential surfaces, capacitors & its expression, charging of the capacitors, time constant, series & parallel combination of capacitors, (Numerical). 4.2 Single Phase A.C. Circuits: Representation of a sinusoidal AC quantity by a phasor, mathematical expression & wave diagram, phase & phase difference. | 9 | 12 |
| 5 | 5.1 Single Phase A.C. Circuits : Relationship between voltage & current for pure resistive, pure inductive & pure capacitive circuits, inductive reactance, capacitive reactance, impedance, conductance, susceptance, admittance, solutions & phasor diagrams of simple R, L & C series & parallel circuits, active power & reactive power & apparent power, power factor, significance of power factor, (numericals). | 14 | 16 |
| 6 | 6.1 Three phase Circuits: Concept of generation of three phase voltages, wave shapes, advantages of polyphase circuits, phasor diagrams, star-delta connections, conversion of star into delta & delta into star, relationship between phase & line values of currents & voltages, expression for power & power factor, (numerical for both balanced & unbalanced loads). | 9 | 12 |

Teaching Methodology : Chalk Board, Discussion, Charts, Transparencies

Term Work:

Skills to be developed:

i) Intellectual Skills:

- Understand the basic concepts of the Electrical Engineering
- Interpretation of the various laws applicable to Electrical Engineering
- Ability to solve simple numerical problem
- Understand electrostatics & ac systems

ii) Motor Skills:

- Connecting the instrument as per given diagram
- Measure various quantities on various meters
- Draw Graph of quantities indicated by meters
- Observe the Results and Compare
- Trouble Shooting & Testing the connections of the equipments & instruments

The term work shall consist of any 12 experiments out of the following:

List of Practicals:

1. To verify Ohm's law
2. To verify the laws of Resistances in series.
3. To verify the laws of Resistances in parallel.
4. To verify the laws of Capacitors in series.
5. To verify the laws of Capacitors in parallel.
6. Measurement of resistance of shunt field winding & estimation of temperature rise in it.
7. To verify Kirchhoff's laws.
8. To determine the variations in values of inductance of variable air-gap inductor for different air-gap lengths.
9. To plot a B-H curve for a ferromagnetic material.
10. To determine the relationship between voltage, current & power for an R – L series circuit with variable resistance.
11. To determine the relationship between voltage, current & power for an R – C series circuit with variable resistance.
12. To determine the relationship between voltage, current & power for an R – L – C series circuit with variable resistance.
13. To determine the relationship between line values & phase Values of voltage & current for a three-phase balanced STAR loads.
14. To determine the relationship between line values & phase Values of voltage & current for a three-phase balanced DELTA loads.
15. To verify STAR – DELTA & DELTA – STAR transformation.
16. Study of a battery, to test a battery for charged & discharged conditions & to charge a battery with different methods.

Learning Resources : A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|----------------|------------------------------|-------------------------------|
| 1 | Cotton H. | Electrical Technology | Pitman Publications |
| 2 | Hughes E. | Electrical Technology | Pearson Education |
| 3 | Theraja B. L. | Electrical Technology | S.Chand & Co. New Delhi |
| 4 | Deshmukh B. H. | Electrical Technology | Nirali Prakashan, Pune |
| 5 | Mehta V. K. | Basic Electrical Engineering | Dhanpat Rai & Sons, New Delhi |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Workshop Practice Course Code : R10EE3305

Course Category : Core Credits : 08

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 4 | 3 | 80 | 20 | - | - | 50 | 150 |

Rationale :

A diploma holder in Electrical Engineering will be involved in installation, operation, and maintenance and testing. This subject covered all of those things which is needed in everyday application. Knowledge of various types of domestic appliances will be useful for maintenance, fault finding and testing of appliances.

It also contains Illumination fundamentals & related calculations, wiring and related calculation, wiring installation and testing.

Objectives :

The students will be able to

1. Know various types of commonly used domestic appliances.
2. Understand the fault detection method of domestic appliances.
3. Understand the concept of Illumination & its fundamentals & study the various types of lamps & calculate no. of lamps for given situation.
4. Know various types of wiring.
5. Design & draw wiring installation.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | <p>1.1 Domestic Appliances: Advantages & disadvantages of electrical energy, Construction, Working, possible faults & their location. Maintenance of commonly used appliances e.g. electrical kettle, storage water heater, electric toaster & hair dryer etc.(some of the appliances to be studied in practicals), Calculation of rating of a water heater, Standard specifications of appliances available in the market.</p> <p>1.2 Purpose of using appliances, components common to all appliances – various insulating materials, switches, timers, heating elements (with properties, required materials to be used for heating elements), thermostats. Bells & Bell indicators.</p> <p>1.3 Construction & working of Microwave oven, Room Cooler, and OTG [Oven Toaster Griller]</p> | 12 | 16 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 Motors used in appliances : General construction of these motors, Types of bushings and bearings. Necessity of earthing of the appliances. How a person is saved from getting an electric shock by providing earthing. Use of megger, multimeter & series test lamp for detecting various types of faults in the appliances.</p> <p>2.2 Fans: Types, construction & working of table & ceiling fans, standard specifications, and methods of speed control. Air movement at various places. Calculations of no. of fans at given location.</p> | 10 | 12 |
| 3 | <p>3.1 Illumination Fundamentals: Lux, lumens, and factors affecting Illumination, Illumination elements at various places. Calculation of Number of Lamps at given situation</p> <p>3.2 Construction and working of G.L.S.(General light service) & Fluorescent lamp, Electronic choke, Calculation of lamps for the resident & commercial locations.</p> <p>3.3 LED lamps, Types Advantages , Disadvantages</p> | 12 | 16 |
| 4 | <p>4.1 Wiring: Electrical symbols as per IS for wiring. Simple light and fan circuits. Schematic & wiring diagrams. Wiring systems & looping systems. Staircase & Godown wiring.</p> <p>4.2 Planning of wiring installation for small residence. Designing & drawing of electrical installation. Planning of switchboard for light & fan circuits using dimensions, preparing material list.</p> | 10 | 12 |
| 5 | <p>5.1 Wiring Accessories: Switching, protecting, terminating & miscellaneous devices. Types of wires. Methods of wiring. Wooden, PVC casing & capping, PVC batten wiring, concealed & surface conduit wiring.</p> <p>5.2 Procedure of all these wiring methods. Factors to be considered for selecting wiring methods. Comparison of wiring methods. Testing of wiring.</p> | 10 | 12 |
| 6 | <p>6.1 Special Appliances: Microwave oven, Washing Machine, and Emergency lighting system.</p> <p>6.2 Uninterrupted Power Supply(UPS) and calculation of Battery capacity.</p> | 10 | 12 |

Term Work :

Skills to be developed:

i) Intellectual Skills :

- Understand the construction & operation of various domestic appliances.
- Identify various parts of domestic appliances & wiring accessories
- Understand various methods of wiring & illumination
- Selection of proper type of wiring & illumination method
- Design of illumination scheme for given location

ii) Motor Skills :

- Dismantling & assembling the home appliances
- Connecting the instrument as per given circuit diagram
- Preparation of extension board & wiring model board

The term work shall consist of the following -

1. Dismantling & assembly of the following appliances to understand the construction, working, fault finding & maintenance of various appliances and corresponding reports of it.

A) Any four out of the following appliances.

- 1) Room heater.
- 2) Electric Heating Pad.
- 3) Immersion heater.
- 4) Electric Oven.
- 5) Electric Bell / Door Chime.
- 6) Soldering iron.

B) Any five of the following appliances:

- 1) Simple & Automatic Toaster.
- 2) Geyser.
- 3) Simple & Automatic iron.
- 4) Washing machine.
- 5) Vacuum cleaner.
- 6) Microwave Oven.
- 7) OTG(Oven, Toaster, Griller).

C) Fluorescent lamp

D) Fan

2. To prepare an extension board consisting of not less than 5 wiring accessories. The student has to decide the plan.
3. To prepare a model wiring board using wooden batten or PVC conduit method of wiring.

Professional Practice:

A group of 3 to 5 students should collect the information brochure of any one electrical appliance from market, prepare a comparative statement and should present it as a part of Term work.

Learning Resources :

Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|------------|---|------------------------------|
| 1 | S.L.Uppal | Electric Wiring, Estimating and Costing | Khanna Pub., New Delhi |
| 2 | B.D.Arora | Electric Wiring, Estimating and Costing | S. Kataria & Sons, New Delhi |
| 3 | K.B.Bhatia | Study of Electric Appliances | Khanna Pub., New Delhi |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Measurements

Course Code : R10EE3306

Course Category : Core

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | 50 | - | 50 | 200 |

Rationale:

Every part of engineering (design, construction, operation, installation, maintenance, testing) needs feedback that can be gained only through measuring the unknown quantities. This course will help a Diploma holder in Electrical Engineering to learn the basic principle, construction, operation & application of electrical measuring instruments.

Objectives:

The students will be able to

1. Know the characteristics of various electrical measuring instruments like accuracy, precision etc.
2. Know the construction & working of various electrical measuring equipments like moving iron, moving coil etc.
3. Know various methods for measuring various electrical quantities like resistance inductance, capacitance power factor etc.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | <p>1.1 Measurements: Necessity of measurement, Classifications of measuring instruments Based on the various effects of the Electric Current, mounting, application etc</p> <p>1.2 Indicating, Recording & Integrating Instruments: Characteristics of instruments such as accuracy, sensitivity, precision, resolution, least count, drift, dead zone. Types of errors. General construction & other details of Electric Instruments such as Deflecting, Controlling & Damping torques, supporting mechanism & bearings.</p> <p>1.3 Mechanical Specification of Instruments – Size capital, types of Mountings etc.</p> <p>1.4 Necessity of Calibration, Traceability.</p> | 12 | 16 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 Construction, Working Principle & Operation of the following Instruments : Moving Coil, Moving Iron (attraction & repulsion type)., Dynamometer, Electromagnetic Induction instruments. Vibration Galvanometer.</p> <p>2.2 Standard & Substandard meters , Calibration using potentiometer , shunt multipliers, series multipliers Extension of range of voltmeter, ammeter Numericals),Extension of range using C.T. & P.T. (connection diagram & Numerical).</p> | 10 | 12 |
| 3 | <p>3.1 Wattmeter: Dynamometer & Induction type wattmeter. Measurement of power in three phase balanced & unbalanced system by three , two & one wattmeter methods. Study of variation of the wattmeter readings with the power factor. Measurement of power using Instrument transformer. Measurement of reactive power.</p> <p>3.2 Energy Meters: Induction type energy meter single phase & three phase. Calibration of energy meter (single phase & three phase),(Numerical). Electronic Energy Meter.</p> | 10 | 12 |
| 4 | <p>4.1 Measurement Of Resistance: Classification of resistance, effect of contact resistance & contact thermo-emf. on the measurement of low & medium resistance, Kelvin's Double Bridge.</p> <p>4.2 Measurement of Breakdown voltage of insulating material. Construction, working & limitatins of Earth tester, Wheatstone bridge, multimeter, megger. Effect of temperature & humidity on the measurement of high resistance & Insulation resistance.</p> | 10 | 12 |
| 5 | <p>5.1 Measurement Of Inductance & Capacitance By Bridge Method: A.C. Bridges: De'sauty's Capacitance Bridge, Maxwell's Inductance Bridge, Schering Bridge. (Numerical)</p> <p>5.2 Other Measuring Instruments : Electrical resonance type & Weston type frequency meter, p.f.meter, Weston synchronoscope, Maximum Demand Indicator, Rotating type phase sequence indicator, Tri-vector meter , Clip-on ammeter(Construction & operation).</p> <p>5.3 Precautions while using deferent Instruments.</p> | 12 | 16 |
| 6 | <p>6.1 Magnetic Measurements: Ballastic galvanometer, measurement of flux by ballastic galvanometer. Gauss/Flux meter, determination of hysteresis loop for ring & bar specimen, Lloyd Fisher magnetic square (Epstein's Square) for measurement of Iron loss.</p> <p>6.2 Dielectric Loss, Measurement: Dielectric loss measurement by 1) Wattmeter method 2) Schering Bridge.</p> <p>6.3 Lux Meter.</p> | 10 | 12 |

Teaching Methodology:- Chalk Board, Discussions, Power Point Presentation

Term Work:

Skills to be developed:

i) Intellectual Skills :

- Identify various types of instruments for various applications
- Select proper type of instrument to measure a particular quantity
- Interpret the results indicated by the instruments
- Understand the construction & operation of various instruments

ii) Motor skills:

- Connecting the instrument as per given diagram
- Measure various quantities on various meters
- Draw Graph of quantities indicated by meters
- Observe the Results and Compare

The term work shall consist any 12 (Twelve) of the following experiments.

1. Measurement of power in three phase circuits by two-wattmeter method.
2. Measurement of power in three phase circuits by three-wattmeter method.
3. Calibration of Single phase Energy meter at different power factors.
4. Calibration of Three phase Energy meter at different power factors.
5. Measurement of high & low resistance.
6. Measurement of Inductance & Capacitance by appropriate bridges.
7. Measurement of Iron loss in a given core using Epstein's Square.
8. Study of variation of $\tan \delta$ with different dielectrics.
9. Measurement of different electrical quantities using CRO.
10. Measurement of Earth Resistance.
11. Measurement of insulation resistance.
11. Measurement of power using C.T. & P.T.
12. Measurement of Breakdown voltage of insulating material.
13. Study of Lux Meter.

Professional Practice:

Students should visit a calibration laboratory of measuring instruments and write a report of the visit as a part of the above term work &/ or a guest lecture of an expert in the field of Electrical Measurement system may be arranged.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Learning Resources :

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------|--|-------------------|
| 1 | Golding E.W | Electrical Measurements & Measuring Instruments | Pitman Publishing |
| 2 | Sawhney A.K | Electrical & Electronic Measurements & Instrumentation | Danpat Rai & Co |

B) Web Sites:

1. [www. automaticalecytricals.com](http://www.automaticalecytricals.com)
2. www.rishabh.co.in

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : A C & DC Circuits

Course Code : R10EE3307

Course Category : Core

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 25 | 125 |

Rationale:

In this course the student will understand the concept of Electric Circuits. This course will also help the student to learn various electrical circuits. This will be more helpful to solve & understand the concept of Transients in Electrical systems.

Objectives:

The students will be able to

1. Know the concept of laws applicable to electrical circuits
2. Understand the theorems applicable to ac & dc circuits
3. Calculate various circuit parameters by applying laws & theorems
4. Know about the concept of transients in electrical circuits

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 D.C. Circuits – Kirchoff's laws , Constant Voltage & constant current sources Nodal Analysis with voltage sources & current sources , Conversion of voltage source into current source & current source in to voltage source (Numericals) | 8 | 12 |
| 2 | 2.1 Network Theorems - Superposition Theorem, Thevenin's Theorem, & Nortan's Theorem Application of Superposition, Thevenin's Theorem, & Nortan's Theorem. (Numericals) 2.2 Maximum Power Transfer Theorem (Numericals), Application of Maximum Power Transfer Theorem. (Numericals). Revision of Star to Delta & Delta to Star Transformation (Numericals). Reciprocity Theorem | 14 | 16 |
| 3 | 3.1 Loop & Nodal method of analysis of electrical circuits using matrix (Numerical) | 7 | 12 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 4 | 4.1 A.C. Circuits – Revision of A.C. series & parallel circuits, Resonance: Series & Parallel (Numericals). Mesh Analysis of electrical circuits | 9 | 12 |
| 5 | 5.1 A.C. Network Analysis - Mesh Analysis, Application of Superposition Theorem & Thevenin's Theorem for A.C. analysis, (Numericals). Norton's Theorem & Maximum Power Transfer Theorem for A.C & D.C. analysis, Application of Norton's Theorem & Maximum Power Transfer Theorem (Numericals) Introduction to Two-Port Network & determination of A,B,C,D parameters. | 16 | 16 |
| 6 | 6.1 Transients: Characteristics of a transient, Variation of the current in R-L series circuits when connected to D.C. & A.C., Time constant, Variation of current in the R- L - C series when switched on to A.C. (Numericals) | 10 | 12 |

Teaching Methodology: - Chalk Board, PPT.

Term Work:

Skills to be developed:

i) Intellectual Skills :

- Understand various laws & theorem applicable to obtain results related to electrical circuits
- Understand the concept of transients in Electrical circuits
- Select proper type of instrument to measure a particular quantity
Able to solve the numerical problems related to Electrical circuits by applying various laws & theorems
- Interpret the results for the electrical circuits.

ii) Motor Skills :

- Connecting the instrument as per given diagram
- Measure various quantities on various meters
- Draw Graph of quantities indicated by meters
- Observe the Results and Compare

The term work shall consists of the following experiments/assignment -

1. Verification of Thevenin's Theorem.
2. Verification of Maximum Power Transfer Theorem.
3. Verification of Norton's Theorem.
4. Verification of Superposition Theorem.
5. Verification of Reciprocity Theorem
6. Study of Star to Delta Conversion.
7. Study of Delta to Star Conversion.
8. Study of series resonance of R-L-C circuits.
9. Study of Transients Responses of R-L & R-C circuit.
10. Study of Transients Responses of R-L -C circuit.
11. Assignment on Transients.
12. Assignment on A.C. Bridges.

Learning Resources :

Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------------|--|-----------------------|
| 1 | Schaum Series | Network Analysis | McGraw Hill |
| 2 | B.L.Theraja | Electrical Technology Vol.-I | S. Chand Publishing |
| 3 | B.L.Theraja | Electrical Technology Vol.-II | S . Chand Publishing. |
| 4 | B.H.Deshmukh | Electrical Engineering | Nirali Prakashan |
| 5 | B.P. Patil, A.S.Zope | Electrical Measurement & Network Theory | Vrinda Publication |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Generation, Transmission & Distribution Course Code : R10EE 3308

Course Category : Core

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 50 | 150 |

Rationale:

An electrical engineer working in the field of project engineering and utilities should possess adequate knowledge of various methods of power generation, power transmission and power distribution considering the economics of the system. In this course the student learn about the various methods of generating power, the equipments involved methods of transmission and distribution along with the economics of power generation.

Objectives:

The students will be able to

1. Understand the concept of generation, transmission & distribution & as well as Non-conventional energy sources.
2. Know about various concepts like load factor, diversity factor etc. & methods of calculating the electricity bills using various tariffs.
3. Understand the functioning of various transmission line components
4. Create awareness about the methods of power factor improvement & advantages of interconnected grid system.
5. Know about the various methods of the transmission systems & advantages of HVAC

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | <p>1.1 Generation: Appreciation of the growth & development of electrical power in the country. Main sources of energy for power generation. Different types of power stations and their operation. Layout and flow diagram, site selection parameters & main equipments of thermal, hydro, nuclear & diesel power stations. Comparison of various power plants with respect to site, initial cost, running cost, limits of source, cost of fuel, cleanliness, simplicity, maintenance cost, plant capacity.</p> <p>1.2 Introduction to non-conventional energy sources for generation of power (solar, Wind, tidal, geothermal etc.) systems and equipments.</p> <p>1.3 Distributed Generation, co-generations. Micro, mini, small & pumped storage plants.</p> | 12 | 16 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 Cost Of Electrical Energy Generation Fixed cost, running cost, cost per unit. Effect of load factor and diversity factor on overall cost of generation (Numericals)</p> <p>2.2 Load forecasting, Load Estimation, Load curves and load duration curves, Demand factor, Load factor, Diversity factor, Plant load factor, Plant Capacity factor, Maximum Demand Factor (Numericals)</p> <p>2.3 Comparison of Peak load and base load plants,</p> | 10 | 12 |
| 3 | <p>3.1 Substations: Types, layout, functions of various equipments & accessories.</p> <p>3.2 Single Line diagrams of various types of Substations, SCADA based substations.</p> | 10 | 12 |
| 4 | <p>4.1 Transmission: Introduction, concept of transmission systems, necessity & types of Transmission systems.</p> <p>4.2 Advantages of High Voltage Transmission and HVDC transmission and its comparison, O. H. & U.G. Transmission. Parameters of transmission, regulation & efficiency. Parameters of short transmission lines. Comparison of single phase and three phase- three wire and three phases – four wire systems of distribution,</p> <p>4.3 Cables: Types and construction, XLPE cables, Comparison of overhead lines and underground cables, types of faults on cables, Testing of faults, Murray Loop test, Cable specifications. Capacitance test for Open Circuit Fault. Cable Test as per IS</p> | 12 | 16 |
| 5 | <p>5.1 Mechanical systems of Transmission lines. Constructional features of transmission lines. Line supports, insulators.</p> <p>5.2 Corona: formation and its effects on performance of lines</p> <p>5.3. String Insulators: Voltage distribution of a string of insulator, string efficiency, (Numericals) Equalization of potential</p> <p>5.4. SAG: Calculation of sag at level supports, wind and ice loads consideration (Numericals). Express feeders for Rural and Urban Distribution. Use of sag templates Indian electricity rules pertaining to clearances, stringing of lines.</p> | 10 | 12 |
| 6 | <p>6.1 Feeders And Distributors: service mains, radial and ring main distributors. A. C. distributor fed from one end (Numericals)</p> <p>6.2 Tariffs: Objectives and characteristics, Types of tariffs, Preparation of annual bill. (Numericals) Study of existing Tariff structure of MSEDCL.</p> | 10 | 12 |

Term Work:

Skills to be developed:

i) Intellectual Skills :

- Identify various terms related to Electrical, Generation, Transmission & Distribution system.
- Understand the transmission system diagrams.
- Interpret the results indicated by the instruments.
- Interpret the drawing of the Electrical Generation, Transmission & Distribution System.
- Understand the construction, operation of various instruments, apparatus.

ii) Motor Skills:

- Drawing schematic electric diagrams & component drawings.
- Drawing layout of large electric installation like substation.
- Collecting data sheet.

The term work shall consist of the following assignments –

The drawing sheets of A1 size any three of the following.

1. The schematic diagram of any one type of generating station.
2. Types of insulators.
3. Types of cables (cross sectional view) .
4. Layouts of substations, pole mounted substation –elevation.

Professional Practice:

1. Students should visit to a Transmission / Distribution substation and prepare a visit report of it as a part of above Term Work.
2. Student should collect data sheets related to the various transmission and distribution Components and / or Tariff structure for HT/LT installation.

Learning Resources :

A) Books :

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------------|---|-----------------------------------|
| 1 | V. K. Mehta | Principles of Power System, | S. Chand and company, N. Delhi |
| 2 | B. R. Gupta | Generation of electrical energy | TMH Publication, |
| 3 | M.V.Deshpande | Electrical Energy generation and transmission, | TMH Publication |
| 4 | Soni,Gupta, Bhatnagar | A text book on power system engg. | D. Rai and company Delhi. |
| 5 | J.B. Gupta | A course in Electrical Power | TMH Publication. |
| 6 | Dr. S.L.Uppal | Electrical power | Khanna publisher New delhi. |

B) Web sites for references:

- www.mahagenco.com
- www.mahatransco.com
- www.mahadiscom.co.
- www.alstomindia.com
- www.udheindia.com

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : D. C. Machines & Transformers Course Code : R10EE 4301

Course Category : Applied Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | 50 | - | 25 | 175 |

Rationale:

A diploma holder in Electrical Engineering may be required to operate or maintain a D.C. Machines. So in his career for various aspects like operation, selection, maintenance etc. In this course student will acquire knowledge about the working principle of D.C. Generators & Motors, their construction, performance characteristics, operation & control, tests & special features of D.C. Machines. This knowledge will help him to understand the operation of other rotary machines also.

In every field of Electrical Engineering such as utilization, transmission & distribution of electrical energy the transformers are needed. The knowledge about Transformers is essential for an Electrical Engineer. In this course the student will acquire knowledge about the working principle of Transformers, their construction, performance characteristics, operation, tests, special features & applications

Objectives:

The student should be able to

1. Understand general construction & operation of D.C. Machines, Transformers, their types, and performance parameters.
2. Explain the various concepts related to the D. C. motors, Transformer performance & testing of these machines.
3. Know the starting methods & speed control methods of the D.C. motors.
4. Calculate various parameters related with performance of Transformer.
5. Explain the working of special transformers & 3 phase Transformers.
6. Conduct various tests on transformers & analyze the results.
7. Know the design procedure of a Distribution Transformer.

Course Details :

| UNIT | NAME OF THE TOPIC | | HOURS | MARKS |
|------|-------------------|--|-------|-------|
| 1 | 1.1 | D.C. Machines: Construction & working Principle of D.C. Machines. Types of armature winding. Lap & Wave winding (concept of simplex, duplex & multiplex winding). | 10 | 12 |
| | 1.2 | D.C. Generators: Armature reaction & commutation. Remedies to reduce armature reaction & commutation troubles. | | |
| | 1.3 | Characteristics of series, shunt & compound generators (nature & interpretation of graphs) | | |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 D.C.Motors – Principle of operation, development of torque & back emf, torque equation (Numericals).</p> <p>2.2 Characteristics of shunt, series motors- torque Vs speed, speed Vs armature current, torque Vs armature current. Study of D.C. Motor starters. Methods of speed control of D.C.Motors. Losses & efficiency of D.C. Machines (Numericals).</p> <p>2.3 Testing of D.C. Motors – Brake test, Applications of D.C.Machines (Numericals).</p> | 13 | 16 |
| 3 | <p>3.1 Transformer- Construction & principle of working of 1 phase & 3 phase transformers, emf equation & voltage, current relationships, specifications.</p> <p>3.2 Ideal Transformer on no load, Losses & efficiency of transformer (Numerical), condition for maximum efficiency.</p> | 10 | 12 |
| 4 | <p>4.1 Phasor diagrams on no load & load at different p.f. Equivalent circuit diagrams of transformer. Voltage regulation of Transformer (Numericals).</p> <p>4.2 Special purpose transformers - Construction & applications, of Auto Transformer, Comparison of two winding transformer & auto transformer, Cast resin Transformer.</p> | 9 | 12 |
| 5 | <p>5.1 Tests on Transformer- Polarity test, direct loading test, O.C./S.C. Test, Sumpner's test (Numerical). Parallel operation of transformers. Comparison of 3 phases & 3 single-phase transformers. Routine & Type tests for Transformers as per IS,(6600-1972), Phasor group.</p> <p>5.2 Necessity of providing tapplings for transformer, types of tap changers, on-load & off-load tap changers.</p> | 12 | 16 |
| 6 | <p>6.1 Three phase transformer connections. Special purpose transformers- construction & applications of toroidal transformer, amorphous core transformer & welding transformer.</p> <p>6.2 Design of 3 phase Distribution Transformer- magnetic circuit design, Winding design – types, materials & elementary design (Numerical).</p> <p>6.3 Difference between power & distribution transformer.</p> | 10 | 12 |

Teaching Methodology : Chalk Board, Discussions, Power Point Presentation

Term work:

A] Skills to be developed:

i) Intellectual Skills:

- Understanding the construction & working the dc machines & transformers
- Identify the types of the dc machines & transformers
- Discrimination the results obtained from the experiment
- Selection the proper apparatus/ instruments/equipments
- Interpretation of the results obtained from the tests of the machines

ii) Motor Skills:

- Connecting the instrument as per given diagram
- Measure various quantities on various meters
- Draw Graph of quantities indicated by meters

The term work shall consist of any twelve of the following the following experiments.

- 1 Study of D.C. Shunt Motor.
- 2 Internal & External Characteristics of D.C. Shunt Generator.
- 3 Magnetization Characteristics of D.C. Shunt .
- 4 Starting & reversing of direction of rotation of dc shunt motor.
- 5 Load Characteristics of D.C. Shunt Motor.
- 6 Brake Test of dc series motor.
- 7 Polarity Test of Single phase transformer.
- 8 Verification of transformation ratio of single phase transformer.
- 9 Direct loading test of Single phase Transformer.
- 10 O.C. / S.C. Test of Single phase Transformer.
- 11 Back to Back Test on Single Phase Transformer.
- 12 Scott Connection of Single phase Transformers.
- 13 Parallel operation of Single phase Transformers.
- 14 Study of three phase transformer connections.

Professional Practice:

1. Students should visit Transformer Manufacturing Unit; write the visit report and submit it along with above Term-work.
2. The student should collect data sheet of DC machine / Transformers and prepare comparative report as part of term work
3. An Expert lecture on the topic related with transformer manufacturing/ DC machine manufacturing and prepare a lecture report.

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Learning Resources:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------|---------------------------------------|---------------------------------|
| 1 | M.G. Say | Performance & Design of A.C. Machines | CBS Publications, New Delhi |
| 2 | B.L. Theraja | Electrical Technology (Volume II) | S.Chand & Co, New Delhi |
| 3 | Nagrath & Kothari | Electrical Machines | Tata McGraw Hill Co., New Delhi |
| 4 | B.H. Deshmukh | Electrical Technology | Nirali Publications, Pune |
| 5 | Clayton & Hencock | Performance & Design of D.C. Machines | CBS Publications, New Delhi |
| 6 | H.Cotton | Electrical Technology | Pitman Publications |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : A.C. Motors & Generators

Course Code : R10EE 4302

Course Category : Applied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | 50 | - | 50 | 200 |

Rationale:

A diploma holder in Electrical Engineering has to deal with A.C. Motors & Generators in his career for various aspects like operation, selection, maintenance. In this course student will acquire knowledge about construction, working principle, performance characteristics, operation & control of AC Motors, Alternators, Special purpose A.C. motors.

Objectives:

The student will be able to

1. Know the working principle , construction & operation of Induction motor (3 phase & 1 phase), Synchronous motor, Servo motor, Hysteresis motor, Universal motor, Reluctance motor.
2. Calculate the parameters of 3 phase Induction motor such as slip, frequency, efficiency, torque, speed regulation, & parameters of equivalent circuit.
3. Draw circle diagram of 3 phase Induction motor & Analyse it.
4. Calculate the various parameters of 3 phase Alternator.
5. Understand the effects of parameters on performance of Alternator & Synchronous Motor.
6. Know about various methods of starting of Induction & Synchronous Motors.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | 1.1 Three phase Induction Motor- Introduction, production of Rotating Magnetic Field (RMF), conditions for production of RMF, Principle of working of 3 phase Induction Motor, relation between speed, number of poles & frequency. 1.2 Constructional parts & features. Types of 3 phase Induction Motor, rotor frequency, rotor emf, rotor current and rotor p.f. under standstill condition & in running condition, specifications. 1.3 Factors determining torque, relation between full load torque & standstill torque, full load torque. Relation between rotor Cu loss, rotor output, and rotor input. Power flow diagram, efficiency(Numerical) | 14 | 16 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 2 | <p>2.1 Torque-Slip Characteristics: methods of improving starting torque in Slip Ring & Squirrel cage Induction Motor as generalized a Transformer.</p> <p>2.2 Equivalent circuit & phasor diagram of three phase Induction Motor Determination of performance characteristics of 3 phase Induction Motor by load test, Light run & blocked rotor test. Determination of various quantities from circle diagram (Numerical).</p> <p>2.3 Induction motor as induction generator.</p> | 9 | 12 |
| 3 | <p>3.1 Necessity of starters, for 3-phase Induction Motor. Study of Direct On Line & Star-Delta starter, Relation of Induction Motor output with its dimensions.</p> <p>3.2 Methods of Speed control of 3 phase Induction Motor including electronic control, voltage, frequency & rotor resistance. Applications of three phase Induction Motor</p> | 9 | 12 |
| 4 | <p>4.1 Synchronous Machines – Introduction, Construction & working principle of Alternator, EMF equation of Alternator.</p> <p>4.2 Armature winding of 3 phase machines- Pitch factor, Distribution factor, Synchronous Reactance and phasor diagram of Alternator. Voltage regulation, emf method (Numerical) Armature Reaction.</p> | 9 | 12 |
| 5 | <p>5.1 Alternator- operation of Alternator. Effect of change of Excitation & Input parameters on Alternator performance, parallel operation, Concept of infinite bus-bar, power angle, synchronizing power, sharing of load (Numerical).</p> <p>5.2 Synchronous motors- Introduction, Principle of operation, phasor diagram, torque power relation, effect of change of excitation & output power on performance. Starting methods & hunting, Synchronous condenser. Applications of Synchronous motor.</p> | 14 | 16 |
| 6 | <p>6.1 Single phase motors- Introduction, classification, construction, principle of operation, performance characteristics, applications.</p> <p>6.2 Repulsion start induction run, capacitor start & capacitor run, two-value capacitor, Shaded Pole motors.</p> <p>6.3 Single phase Synchronous motors- Reluctance, Hysteresis, Universal motor, Stepper motor & Servomotor, Brush less DC motor (BLDC).</p> | 9 | 12 |

Teaching Method: Chalk Board, Power Point Presentation, Slides

Term Work:

i) Intellectual Skills:

- Understanding the construction & working the AC machines.
- Identify the types of the AC machines.
- Discrimination the results obtained from the experiment.
- Selection the proper apparatus/ instruments/equipments.
- Interpretation of the results obtained from the tests of the machines.

ii) Motor Skills:

- Connecting the instrument as per given diagram.
- Measure various quantities on various meters.
- Draw Graph of quantities indicated by meters.

The term work shall consist of following any twelve experiments

1. Study of 3 phase induction Motor Starters.
2. Starting & reversing of direction of rotation of three Phase Induction Motor.
3. Direct loading of three phase Squirrel Cage Induction motor as per IS (325-1978).
4. Slip Measurement of three phase Slip Ring Induction motor.
5. N - C characteristics of three phase Slip Ring Induction Motor.
6. Light run & Blocked rotor test on 3 phase Squirrel Cage Induction motor as per IS (325-1978).
7. Study of Single Phase Induction Motors.
8. Load test on 1 phase Induction motor.
9. Starting & reversal of Single Phase induction motor & determination of no load power factor.
10. Direct loading test of 3 phase Alternator as per IS (325-1978).
11. O.C. / S.C. Test on 3 phase Alternator as per IS (325-1978).
12. To perform the experiment to plot VEE curves of 3 phase synchronous motor.
13. Study of Stepper motor.

Professional Practice:

Students should visit a manufacturing/ repairing unit of Induction Motor/ Alternator and write a report and submit it with above term work. They should also collect the information brochures regarding Electrical Motors/ Alternators of various manufacturing Company as a part of Term work.

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Learning Resources:

A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------|---------------------------------------|---------------------------------|
| 1 | M.G. Say | Performance & Design of A.C. Machines | CBS Publications, New Delhi |
| 2 | B.L. Theraja | Electrical Technology (Volume II) | S. Chand & Co, New Delhi |
| 3 | Nagrath & Kothari | Electrical Machines | Tata McGraw Hill Co., New Delhi |
| 4 | S.K. Bhattacharya | Electric Machines | TTTI, Chandigarh |
| 5 | H.Cotton | Electrical Technology | Pitman Publications |
| 6 | Ashfaq Hussain | Electrical Machines | Dhanpat Rai & Co. Delhi. |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Design & Drawing Course Code : R10EE 4303

Course Category : Applied Credits : 04

Teaching and Examination Scheme :

| Teaching Scheme | | | Examination Scheme | | | | | | |
|-----------------|----|----|--------------------|----|------|----|-----|----|-------|
| TH | TU | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| - | - | 4 | - | - | - | - | 50@ | 25 | 75 |

Rationale:

A diploma holder in Electrical Engineering is supposed to have good knowledge of designing. He is required to understand and interpret the drawing prepared by others. He should have knowledge & familiar with the Earthing methods as per Indian Standard, the schematic diagram of Starters and winding diagram of Electrical Machines. Designing of Distribution Transformer is also expected from him. The design of the Curriculum of this subject is done keeping the above requirements, in view.

Objectives:

The student will be able to

1. Understand the methods of earthing as per IS.
2. Draw & interpret the diagrams of equipments like starter.
3. Draw & interpret the winding diagram Electric motor.
4. Design & draw the details of assembly of a distribution transformer.

Term Work:

Skills to be developed

i) Intellectual Skills:

- Understanding the components of plate & pipe earthing system , starters & transformer.
- Interpretation of the drawing of winding , earthing system & transformer assembly.
- Design of a distribution transformer from the given data.
- Report writing of the design.

ii) Motor skills :

- Drawing of Earthing system ,starter & winding diagram of electric motor.
- Drawing of assembly of distribution transformer as per design.

List of Practical /Experiment/Assignment:

The term work shall consist of following.

4 Numbers of A1 size drawing sheets on the following topics.

1. Earthing systems as per IS for
 - i. Plate Earthing
 - ii. Pipe Earthing
2. Winding diagram for 3-phase A.C Machine with coil connection diagram.
3. Schematic diagrams of Automatic star-delta starter, D.O.L starter, Rotor resistance starter with protective devices.
4. A student has to design a distribution transformer as per given data and draw a sheet to the scale as per the design. A detailed design report should be submitted.

REFERANCE BOOKS:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------|-------------------------------------|--------------------------------|
| 1 | Bhattacharya | Electric Engineering Drawing | TTTI, Chandigarh |
| 2 | Narang, | Electric Engineering Drawing | TMH, New Delhi |
| 3 | A.K.Sawhney | A Course in Electric Machine Design | Dhanpat Rai and Co. New Delhi. |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Utilization of Electrical Energy

Course Code : R10EE 4304

Course Category : Applied courses

Credits : 04

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | - | 3 | 80 | 20 | - | - | - | 100 |

Rationale:

It is expected that the Diploma Holder in Electrical Engineering has to deal with number of electrical equipments in the Industry from the various aspects like operation, maintenance, testing etc. For this he should have the basic knowledge about the construction & operation of this equipment. In this course the students will learn about the various modes by which electrical energy is utilized in industries, through various equipment for heating, welding, illumination etc.

Objective:

The student will be able to

1. Understand the working principle , construction ,operation, characteristics , applications of the halogen lamp, sodium vapor lamp, neon lamp, mercury vapor lamp
2. Understand the basic principles of electric welding & heating.
3. Calculate the dimensions of the heating elements energy, efficiency from the given data.
4. Know about various drives used in the industry. & their characteristics & the factors to select drive for particular operation.
5. Know about system of traction in India, equipment used for them , their construction & operation.
6. Calculate the tractive force, energy consumption, torque, power & speed.
7. Use IS for electrical heating, welding & also handbooks of Indian Railways.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Illumination :Source of light, Halogen lamp, Discharge lamps like mercury vapor, Sodium vapor, Neon, LED & Xenon lamps, Flood lighting, Industrial lighting. 1.2 Automobile Electrical Systems : Electrical components used for 2 wheeler & 4 wheeler automobiles like batteries, magnetos, contact breakers, ignition coils, cut outs, voltage & current regulators spark plugs, various types of lamps, alternators and dynamos, connection diagrams of these components. | 10 | 12 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | Electric Drives: introduction, types of drives, types of loads, advantages, disadvantages, applications & characteristics of group, individual & multipurpose drives, selection of electric drive, factors governing selection of electric motor, types of enclosures, heating & cooling curves, ratings of machines, methods for calculations of kW of motor for given load cycle (numericals on rating). Load equalization, motors for particular services, applications of electric drives. | 12 | 16 |
| 3 | <p>3.1 Electrical Heating & Melting : Introduction, advantages, disadvantages & applications, modes of transfer of heat, heating element materials & design, losses, efficiency (Numerical). Temperature control of resistance oven / furnaces, causes of failure of heating element, electric heating methods: resistance heating, salt-bath heating & infra red heating, arc furnaces, power supply & control.</p> <p>3.2 Induction heating: direct core, indirect core, vertical core & coreless induction furnaces (Numerical). High frequency power supply sources, high frequency eddy current heating. Dielectric heating (Numerical). Choice of frequencies for induction & dielectric heating.</p> | 10 | 12 |
| 4 | <p>4.1 Electrical Welding: Introduction, requirements of good weld. Advantages, disadvantages & applications. Types of electrical welding processes / equipment. Types, equipments, operation, characteristics, advantages, disadvantages & applications of electric resistance, electric arc, ultrasonic, electron beam & laser beam welding. Power supply for resistance & arc welding.</p> <p>4.2 Electric Traction: Introduction, different systems of traction, systems of electric traction. Power Supply for Electric Traction: Introduction, systems of track electrifications, current collecting systems (conductor rail system & over head system). Current collectors for O.H system, O.H. construction for tramways, trolleybuses & railways.</p> | 10 | 12 |
| 5 | <p>5.1 Electric Traction: Train Movement & Energy Consumption: Introduction, speed-time curves (Numerical). Mechanics of train movement (Numerical). Specific energy output & specific energy consumption (Numerical).</p> | 12 | 16 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | <p>Electric Traction Motors: Desirable characteristics. DC series motor, 1-phase a series motor, 3-phase induction motor & Linear Induction Motor as the traction motors, their features & operating characteristics.</p> <p>5.1 Controls of Traction Motors: Starting & speed control of dc series (traction) Motor. Rheostatic control, series-parallel, field control, M-G locomotive control, diesel-electric locomotive control, transition methods, drum controller, contactor type controller, buck & boost method, thyristor control.</p> <p>Starting & speed control of 1-phase ac series motor.</p> | | |
| 6 | <p>6.1 Electric Traction: Requirements, mechanical regenerative braking. Magnetic track , brakes. Electromechanical drum brakes, eddy current brakes. Multiple Unit Control.</p> <p>6.2 Traction Substations: Transmission systems, substation for 1-phase ac railways, location of substations, feeding & distributing systems, block diagram of an A.C. locomotive.</p> <p>6.3 Train lightings- Requirements, Equipments.</p> | 10 | 12 |

Teaching Methodology: Chalk Board, PPT, Transparencies

Skills to be developed:

1) Intellectual Skills:

- Understanding the working principle, construction , operation & application of various types of lamps, electrical heating welding & melting equipments
- Understanding the automobile electrical system
- Understanding the traction systems & construction & operation of equipment used in them
- Solving simple numerical problems electric traction & electric heating

Professional Practices:

Visit to loco shed / industry manufacturing heating / welding unit. Literature survey.

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Learning Resources:

Books:

| SR.No. | AUTHOR | TITLE |
|--------|-------------------------|---|
| 1 | Taylor E. O | Utilization of Electrical Energy |
| 2 | Partab H | Art & Science of Utilization of Electrical Energy |
| 3 | Soni, Gupta & Bhatnagar | A Course in Electrical Power |
| 4 | Uppal S. L | Electrical Power |
| 5 | Partab H | Modern Electrical Traction |
| 6 | Sayyed B. C. | Utilization of Electrical Energy |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electric Motor Control

Course Code : R10EE4305

Course Category : Applied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rational:

In the sophisticated industries, an electrical engineer is expected to work on the drives run by the electric motors, which have different working characteristics. He has to deal with the electronic control of motors also. In this course the students will undergo the revision of the motor characteristics, the various concepts of the drives and control through the electronic circuitry.

Objectives:

The student will be able to

1. Understand the importance of the electric drives over the other drives & the various concepts related to the drives.
2. Understand the various methods of controlling the induction motor & its starters.
3. Know the various methods of starting & stopping of the motors.
4. Know the importance of the electronic speed control.
5. Understand the safety measures of the motors & drives.
6. Know the basic principle of PLC & CNC control.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | Types of Drives. Advantage of Electrical Drives over other drives. Four-quadrant concept of drives. Types of industrial loads. Revision of Speed-Torque Characteristics of various types of electrical motors. Stability of Drives. | 10 | 12 |
| 2 | 2.1 Starting characteristics of Induction Motor. Effects of starting current on power lines motor & load. Need of reduced voltage starting, methods of reducing voltages, their advantages & disadvantages. 2.2 Automatic starters & control circuit for poly phase motor for resistance, reactance, autotransformer & star delta starter. | 10 | 12 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 3 | 3.1 Automatic starter & control circuit for D.C. Motor - current limit acceleration starters for shunt motor, Jogging of DC Motors. Soft starters for AC & DC motors. 3.2 Principle for Electronic control for controlling the speed of DC Motors. | 12 | 16 |
| 4 | 4.1 Principle of Electronic speed control for AC motors - Characteristics of V/f control. Schematic diagram of electronic speed controller for AC & DC motors. 4.2 Electrical braking of motors - Types of braking of DC motors-Regenerative & Plugging. | 10 | 12 |
| 5 | 5.1 Plugging & Dynamic braking of AC motors - Control of single-phase motors. 5.2 Study of Electromechanical brakes. Study of various types of overload relays. Study of electromagnetic clutches-advantage of using clutch. | 10 | 12 |
| 6 | 6.1 Study of single phasing preventer - Study of voltage stabilizer for three & single-phase supply. Solid-state relays- General construction & application.CNC control for machines.PLC Principle & Ladder diagram. | 12 | 16 |

Teaching Methodology: Chalk Board, Discussions, Power Point Presentation.

A) Term Work :

Skills to be developed:

i) Intellectual Skills:

- Understanding the concept of drives & their control.
- Understanding the operation of various types of starters.
- Identify the suitable type of drive for a particular application.
- Understand the working of Voltage stabilizer, single phasing preventer, clutch & brake.
- Select proper type of instrument to measure a particular quantity.
- Interpret the results indicated by the instruments.
- Understand the methods of operation of various types of speed control.

ii) Motor Skills:

- Connecting the instrument as per given diagram.
- Measure various quantities on various meters.
- Draw Graph of quantities indicated by meters.
- Observe the Results and Compare.

B) List of Practical /Experiment/Assignment:

The term work shall consist of following experiments.

1. Study of Automatic star-delta starter.
2. Study of automatic reduced voltage starter for DC Shunt motor.
3. Braking characteristics of DC motor by Plugging.
4. Braking characteristics of DC motor by Rheostatic method.
5. Braking characteristics of AC motor by Plugging Method.
6. Braking characteristics of AC motor by Dynamic Breaking Method.
7. Operation of Voltage operated single phasing preventer.
8. Operation of Current operated single phasing preventer.
9. Electronic speed control for DC motors.
10. Electronic speed control for AC motors.
11. Study of Electromagnetic Brakes.
12. Study of Electromagnetic Clutches.

Learning Resources:

A)Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---|--------------------------|------------------|
| 1 | Pillai | Industrial Drives | New Age |
| 2 | Iswer | Electrical Motor Control | Tata McGraw Hill |
| 3 | Vedam Subramanyam | Electric Drives | Prentice Hall |
| 4 | Catalogues of various types of starters | - | - |

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DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Industrial Electronics

Course Code : R10EX 4306

Course Category : Applied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 50 | 150 |

Rational:

A diploma holder of Electrical Engineering has to deal with Electronic components as every Electrical System for the purpose of control or application. In this course the student will learn about the Inverters, SCRs as controllers, Counters, Regulated power supply & various types of resistance welding.

Objectives:

The student will be able to

1. Describe the working of SCR.
2. Understand various speed control methods.
3. Draw Digital circuits.
4. Understand the Regulated power supply.
5. Know resistance welding, induction heating, and dielectric heating.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | 1.1 SCR - Introduction to SCR, V-I Characteristics, SCR as a controlled rectifier, Control rectifier half wave using R-L load. Control rectifier FWFC using R & R-L load. Different Triggering methods of SCR, using R, RC & UJT. 1.2 Commutation - Forced & natural commutation methods. Methods of commutation: Class A, Class B, Class C, Class D, Class E, Class F. 1.3 Temperature control circuit using SCR . SCR specification., Operation & Waveform. | 12 | 16 |
| 2 | 2.1 Motor Control - soft start circuit, requirement & simple circuit operation. 2.2 Speed control of D.C. Shunt motor - using SCR with using armature voltage control & field current control. 2.3 Speed control of A.C. motor - using SCR, circuit diagram & operation. Different techniques used for control of motors. 2.4 Counters types - Block diagram, asynchronous & synchronous counters. Divide by N counter. | 10 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 3 | <p>3.1 Introduction to electronics timer - Basic principle of operation, advantages over other conventional timers. Different types of timers using BJT, UJT and SCR. Schmitt trigger circuits using transistors. Introduction to Multivibrator.</p> <p>3.2 Number system - Binary, BCD, Decimal, Octal, hex, code conversion techniques.</p> <p>3.3 Integrated circuit - Circuit concept of IC's. Classification of IC's:- SSI, MSI, LSI, VLSI, ULSI. Comparison between analog & digital IC's & their specification.</p> <p>3.4 Logic gates - Symbol, truth table of all basic gates: AND, NOT, NAND, NOR, EXOR. Flip-flops: RS, JK, T & D TYPE, master slave, FF their symbol, truth table & race around condition.</p> | 10 | 12 |
| 4 | <p>4.1 Digital Multimeter - block diagram, application & comparison with analog multimeter.</p> <p>4.2 Servo Mechanism - Introduction of open loop system & closed loop system.</p> <p>4.3 CRO - block diagram of CRO. Measurement of electric quantity & application. Basic parts of servomechanism, block diagram & working, applications.</p> <p>4.4 Introduction to Inverters - types, using SCR, BJT Series Inverters, parallel inverters, operation & waveform.</p> | 12 | 12 |
| 5 | <p>5.1 Regulated power supply - Zener regulator, series, shunt type using transistor.</p> <p>5.2 Variable voltage regulator - using IC 723, Specification 7 pin-out diagram. Different modes of operation using IC 723.</p> <p>5.3 A.C.Voltage Stabilizer - block diagram, specification.</p> <p>5.4 Solid state & servo stabilizer block diagram & comparison.</p> <p>5.5 IC 555 - block diagram specification, application, description & pin configuration. Astable, monostable & Schmitt Trigger using IC 555.</p> | 10 | 12 |
| 6 | <p>6.1 Introduction of Microprocessor Architecture of 8085</p> <p>6.2 PIN Diagram Control Signals, Multiplexing of Address and Data BUS</p> <p>6.3 Introduction of Microcontroller, Comparison between Microcontroller and Microprocessor</p> | 12 | 16 |

Teaching Methodology: Chalk-Board, Group Discussion, Power Point Presentation, Transparency, Expert Lectures.

Term Work :

Skills to be developed:

i) **Intellectual Skills:**

- Understanding the working of the SCR, commonly used ICs.
- Understanding the working of digital multi meter, inverter, power supply.
- Understand the basic concepts of microprocessor.
- Identify the electronic method of speed control for electric motor.

ii) **Motor Skills:**

- Connecting the instrument as per given diagram.
- Measure various quantities on various meters.
- Draw Graph of quantities indicated by meters.
- Observe the Results and Compare.

List of Practicals / Assignments / Experiments. (Minimum Ten):

Study of Logic Gates

1. IC 555 in astable/ monostable mode.
2. Study of SCR firing circuits.
3. Study of controlled rectifiers.
4. Study of parallel Inverter.
5. 78XX & 79XX as Voltage Regulator.
6. Series pass transistor voltage regulator.
7. IC 723 as voltage regulator.
8. Study of counters.
9. Study of Flipflops.
10. Study of CRO/DVM.
11. Demonstration and study of Microcontroller Kit.
12. Demonstration and study of 8085.

Learning Resources:

A)Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------|---|--|
| 1 | Millman & Halkies | Elements of Electronics | Prentice Hall of India, New Delhi. |
| 2 | V.K.Mehta | Principles of Electronics | S. Chand & Co., New Delhi |
| 3 | Ramesh Gaonkar | Microprocessor, Architecture, programming and application with 8085 | Penram International Publishing(India) Pvt. Ltd. |
| 4 | P.S. Bhimbra | Power Electronics | Dhanpat Rai & Co., New Delhi. |

B) Magazines :

- Electronics for you.

C) Web sites for references:

- www.en.wikipedia.org
- www.electronics-tutorials.com
- www.indianscientificinstrument.com
- www.alldatasheet.com

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Low Tension Switch Gear

Course Code : R10 EE4307

Course Category : Applied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rational:

An Electrical Engineering Diploma holder working in industries has to handle various types of low -tension switchgear like MCB, MCCB, and Contactor etc. He should be aware of various specifications of these items for their selection. In this course the student learn about principle of operation, construction, working, maintenance & selection of various types of low tension switchgear.

Objectives:

The student will be able to

1. Understand the LT Distribution system.
2. Know uses of contactors, relays, circuit breakers, MCB.
3. Develop control system.
4. Know various starters.
5. Know the maintenance of Low Tension equipments.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | <p>1.1 Introduction to low tension Switchgear & its components. Typical L.T. distribution system in an industry. Power Control Centre (PCC), Motor Control Centre (MCC), Power & Motor Control Centre (PMCC), Motor feeder & Switchboard.</p> <p>1.2 Power & Control contactors: Broad definition, construction & operation, comparison with other switching devices with respect to current & mechanical life. Utilization categories & specifications as per IS applications, arc extinction mechanism, selection of contactors, performance test, Pick up & drop off voltage.</p> | 12 | 16 |
| 2 | <p>2.1 Relays. Overload relay- Thermal, Magnetic & Electronic construction, operation & characteristics (IS 13947, PART -4).</p> <p>2.2 Causes of overheating of motors & requirements of thermal relay. Setting of overload relay. Connection diagrams of relays (with or without CT).</p> <p>2.3 Numerical Relays- use for protection- principle of operation, construction & working.</p> | 10 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 3 | 3.1 Induction motor starter. DOL. Starter with thermal relay. Forward-Reverse control circuit & operation. Circuits & operation. Interlocking circuits of contactor. 3.2 Star delta starters Manual Semi automatic and Automatic types, their circuits and operations. 3.3 Soft starters for induction Motor, Operations and their advantages. | 12 | 16 |
| 4 | 4.1 Fuses, Switches & Combination Units: HRC fuses, definition, construction & operation. Various terms associated with fuses. Selection of fuses. Switches – various types, specifications & applications. 4.2 ELCB types (No. of Poles and Current Sensitivity) and Selection. | 10 | 12 |
| 5 | 5.1 Air Circuit Breaker, MCCB and MCB: Definition & necessity of circuit breakers. Arc Phenomenon. Arc extinction method in L.T.C.B., Construction & Operation of L.T.C.B, comparison & selection. 5.2 kVAR Compensation by capacitor banks- Methods. Automatic power factor improvement unit | 10 | 12 |
| 6 | 6.1 Control & metering circuits -Difference between power circuit & control & metering circuits, diagrams for power circuit & control & metering circuits. 6.2 Components used in control & metering circuits Indicating meters used for different measurement. 6.3 CT & its connections in control circuits. Rotary switches [selector switches], Push buttons, Timers, Indicators Limit switches, Hardware used in control panels. | 10 | 12 |

Teaching Methodology: Chalk Board, Power Point Presentation, Discussion.

Term Work :

Skills to be developed:

i) Intellectual Skills:

- Understanding the construction, working of the L.T. Switchgear components like contactors, MCB, MCCB, fuses, switches, overload relays etc.
- Understand the control & power circuit of various types of starters.
- Understand the concept of power factor compensation using capacitor in L. T. circuit.
- Identify the selector switch connections for various applications.

ii) Motor Skills:

- Connecting the instrument as per given diagram.
- Measure various quantities on various meters.
- Draw Graph of quantities indicated by meters.
- Observe the Results and Compare Connecting the instrument as per given diagram.
- Measure various quantities on various meters.
- Draw Graph of quantities indicated by meters.
- Observe the Results and Compare.

The term work shall consist of following assignments.

- 1 Study of contactors.
- 2 Performance test of a contactor.
- 3 Study of DOL starters (Simple, with timers, with interlocks).
- 4 Study of Semi Automatic and Automatic Star Delta Starter.
- 5 Testing of MCB.
- 6 Study of ACB.
- 7 Connections of CTs for ammeter change over switch.
- 8 Connections /wirings of rotary switches.
- 9 Setting a Thermal timer & measuring its operational time.
- 10 Testing of ELCB.
- 11 Study of Limit Switches.
- 12 Assignment on Drawing and explanation of Control Panel Circuit. [Motor Control Centre or Power Control System].

Two assignments- Drawing & explanation of connection diagrams of control panel circuit.

Professional Practice:

1. Student should visit a Switchgear training centre and prepare the visit report for the same as a part of the Term work.
2. Student should collect the data sheets for various L.T. switchgears components and make Comparative statement and present as a report as a part of the term work.

Learning Resources:

A)Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------|----------------------------------|---------------------|
| 1 | Rexford K.B. | Electrical Control of Machines | Delmar Pub. |
| 2 | Eswar U.S | Handbook of Motor Control System | TMH Pub lication. |
| 3 | S. Rao | Switchgear and Protection | Khanna Publications |
| 4 | - | L & T Motor Starter Handbook | Larson & Tubro |

B) Magazines:

1. Electrical India
2. IEMA review

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Estimation & Costing Course Code : R10EE4308

Course Category : Applied Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | - | 50 | 150 |

Rational:

An Electrical Engineer has to go through various processes requiring estimation of materials & costing of the installation. In this course he will learn about the methods of estimation & earthing as per IS, which will be helpful to the quantity of materials & different methods of costing methods of earthing. He also will learn about methods of installations as per IS.

Objectives:

The student will be able to

1. To know about various wiring methods & terminology related with it as per IS:732(1963).
2. To understand the procedure for estimation & costing of domestic & industrial installations.
3. To create awareness about preparation of tender & quotation.
4. To know about the estimation & costing of over head transmission lines & underground cables.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Revision of wiring methods. Standard practices of wiring & requirement of wiring as per relevant (IS: 732-1963). | 10 | 12 |
| 2 | 2.1 Factors to be considered for selection of wiring Selection of wiring methods, layout of wiring. 2.2 Calculations of length of wire & quantity of wiring material for a residential & commercial installation using suitable design of illumination system. Wiring diagram of individual switchboard. Preparation of bill of material (Numerical). | 18 | 28 |
| 3 | 3.1 Earthing : Methods of earthing as per IS: 732-1963 & estimation of cost of installation earthing. Requirement of Earthing installation for Substations, Residential and commercial installations. Earth resistance for various installation. | 14 | 16 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| | 3.2 O.H. Lines & cables installation: O.H. Lines : Main components, Types of supports, Types of insulators, Estimation & costing of O/H Lines. U.G.Cables : Types of cables, Methods of Laying of Cables, Estimation of cost of U.G.Cable installation. Differences between O/H transmission lines & underground cables installations. | 10 | 12 |
| 4 | 4.1 Meaning of terms used in estimation & costing: Principle of estimation purpose of estimation & costing, approximate estimates. Detailed estimates. Preparation of detailed specification, standard specification book. Market rate for material & labours, standard schedules of rate. | 10 | 12 |
| 5 | 5.1 Principles of costing: methods of employing labour & making payments. Preparing rate analysis for items. 5.2 Quotation, pricelists, tenders clauses in tenders. Comparative statement, overhead charges, per point charging & fixed percentage costing, order of supply, payment of bills. Cost escalation clause in tenders & its necessity. | 12 | 12 |

Teaching Methodology: Chalk Board, PPT, Discussions.

Term Work :

Skills to be developed:

i) Intellectual Skills:

- Understand the procedure for estimation & costing for simple domestic & industrial installation, earthing , overhead line & cable.
- Preparation of tender /quotation for given work.
- Understand the principle of costing.
- Identify the electrification, installation, estimation for various applications.
- Select proper method of estimation.
- Interpret the results of the estimation.
- Understand the meanings of the terms related to estimation & costing.
- Design of electrical installation system for domestic & industrial customer , O.H. Line & Cable.

ii) Motor Skills:

- Drawing of domestic & industrial installation diagram as per design.
- Drawing of overhead line or underground cable diagram as per design.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

The term work shall consist of the following.

- 1 Three sheets of A2 size along with estimation report of the following.
 - a. Domestic wiring installation.
 - b. Industrial wiring installation.
 - c. Cable installation or O.H. Line installation.
- 2 Preparation of tender notice or quotation for any electrical equipment or an electrical installation work.

Professional Practice:

- 1 A guest lecture of eminent electrical contractor be arranged and the student should submit the lecture report as part of term work.
- 2 Student should collect the datasheets of various electrical components and accessories and use this data in their term work estimation.

Learning Resources:

Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|---------------|-----------------|---------------------------------|---------------------|
| 1 | Arora | Electrical Estimation & costing | S. Chand & Co |
| 2 | Dr. S. L. Uppal | Electrical Estimation & costing | Khanna Publications |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Installation, Maintenance & Repair Course Code : R10 EE4309

Course Category : Applied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rational:

An Electrical Engineering Diploma holder has to deal with various activities, such as installation of new electric systems, maintaining the existing systems such as rotary machines & repairing them. In this course the student will learn about causes of failure of electrical systems, maintenance types, and various types of installations & commissioning of the projects.

Objectives:

The student will be able to

1. Imagine the location of the fault based on the behavior of the machine.
2. Know the usability of the instruments for fault finding.
3. Describe the preventive maintenance for various machines.
4. Know the IS for the electrical insulation, insulation failure, installation & maintenance.
5. Understand the process for the impregnation.
6. Understand the importance of the safety in industry.
7. Know the handling of the heavy equipments.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | 1.1 Causes of failure of Electrical Equipment- Circuit faults, Electrical & Mechanical faults in Electrical Equipment like D C Machines, Transformer, and Induction motor. 1.2 Tools & instruments used for faultfinding. 1.3 Location of faults in Transformer, D.C. Machines, Induction motor, Synchronous motor, O.H. Lines, Batteries, C.B. | 12 | 16 |
| 2 | 2.1 Preventive Maintenance of Electrical Equipments like Transformer, D.C. Machines, Induction motor, Synchronous motor, O.H. Lines, Batteries, C.B. (as per I.E. & IS No: 5613-1985) Types of maintenance & details. 2.2 Drying out & Varnish Impregnation processes. Need of troubleshooting chart & maintenance. | 10 | 12 |

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE 1

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 3 | 3.1 Causes of insulation failure, Insulation testing as per IS., Transformer oil failure, testing, filtration of Transformer oil. Concept of transformer maintenance considering dissolved gas analysis. 3.2 Installation of Transformer as per IS No: 2026 / 1981, IS 10028 / 1981. 3.3 Winding/rewinding of motor & transformers- Material & procedure. | 10 | 12 |
| 4 | 4.1 Electrical Safety - Statutory regulation (as per IE & IS No: 9001/1992, IS 4884/1968). Permit to work system, Treatment for Electrical shock. Artificial respiration. Types & use of different fire extinguishers. 4.2 Installation of Induction motor & rotary machines. | 12 | 16 |
| 5 | 5.1 Earthing -Revision of earthing methods. Permissible earth resistance for different types of installations. Methods of improving earth resistance. Importance of multiple neutral earthing. Earthing of lightning arrester. IS (3043-1966) 5.2 Earth leakage circuit breaker - general construction & operation. Industrial overhead bus bar system as per IE & IS 5.3 Installation of D.G. Sets. | 10 | 12 |
| 6 | 6.1 General Guideline for loading of Heavy equipments - Equipments & accessories used for loading & unloading of heavy equipment. Installation & commissioning of High & Low Tension overhead lines, cables, fire resistant cables, control cables. Use of fire retardant paint for cables Installation & commissioning of batteries, circuit breakers. 6.2 Introduction to international standards (IEC). | 10 | 12 |

Teaching Methodology: Chalk Board, Power Point Presentations, Discussion.

Term Work :

Skills to be developed:

i) Intellectual Skills:

- Understanding the methods of fault location in various electrical equipments.
- Understand the procedure for installation & maintenance of various electrical equipments as per IS No.
- Understand the safety aspects & procedure as per IS & IE rules.
- Understand the importance of earthing & ELCB.
- Understand the use of equipments used for loading & Unloading of heavy equipments.

ii) Motor Skills:

- Proper assembling & dismantling.
- Testing of the equipments for the healthiness.
- Measurement of the instruments used in repair.
- Handling of tools used for maintenance.

The term work shall consist of the following assignments

1. Study of earth tester & measurement of earth resistance.
2. Testing of Transformer oil or breakdown voltage testing of insulation material.
3. Overhauling of any electrical equipments.
4. Rewinding/winding of small transformer OR choke OR small motor.
5. Location of fault in the following electrical equipments (any two)
 - a. Induction motor.
 - b. D.C. Machines.
 - c. Transformer.

Learning Resources:

Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------|--|------------------|
| 1 | S.K. Bhattacharya | Installation, Maintenance & Troubleshooting of Electrical Equipments | TTTI, Chandigarh |
| 2 | C. Heburt | Preventive Maintenance of Electrical Equipments | McGraw Hill Co. |
| 3 | S.S. Rao | Testing ,Commissioning, Operation & Maintenance of Electrical Equipments | Dhanpat Rai Sons |

1. IS - 1886-1967- code of practice for installation & maintenance of transformer.
2. IS - 900-1968- code of practice for installatin & maintenance of Induction motor.
3. IS - 5615-1970- code of practice for installation & maintenance of Power lines.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Project work and Seminar

Course Code : R10 EE 4410

Course Category : Applied

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|-----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| - | 6 | - | - | - | - | 50 | 100 | 150 |

Rational:

An Electrical Engineer while pursuing his career requires abilities like group working, leadership; work planning, acquiring information & presenting to the colleagues, preparing a neat project report etc. In this course the student get a chance to induce in him some of the above abilities.

Objectives:

The student will be able to

1. Develop the habit of group work, leadership & work co-ordination.
2. Develop the capability, confidence of doing a small project at individual level.
3. Develop the ability to acquire required data & presentation skills, acquire the confidence in communication.
4. Present the information in form of report.
5. Understand the importance of time management.

A) Term Work :

Skills to be developed:

i) Intellectual Skills:

- Identify the project that is to be carried out.
- Discrimination advantageous project.
- Selection the project.
- Interpretation of the difficulties faced.
- Understanding of the laws that are needed for the project.
- Reading the journals, magazines, reference books.
- Design Approach to be developed.
- Report Writing skill to be developed.

ii) **Motor Skills:**

- Fabrication as per design.
- Measurement of quantities.
- Identification of Troubles.
- Observing safety practices while working.
- Draw the graph for the progress of the project.

List of Practical/Experiment/Assignments:

The term work consists of three parts-Individual project, group project & seminar

1. Individual project-

A student has to fabricate a simple electric/electronic gadget. He should understand the functioning of various parts. Some of the gadgets suggested are as follows:

- i) Solid state lamp dimmer
- ii) M.W. Radio Receiver
- iii) Simple electronic controller for temperature, liquid level, light intensity measurement.

The assignments similar to given below may be considered as individual project

- i) Wiring installation of a small room.
- ii) Rewinding of a small single phase motor/transformer.

2. Group Project:

A group of 2 to 5 students should fabricate one electric / electronic equipment. Preference should be given to Industry sponsored projects. Some of the projects are as suggested.

1. Fabrication of control panel.
2. Rewinding of a 3-phase motor.
3. Digital clock.
4. Lamp bank.
5. UPS.

3. Seminar:

A student has to study a topic generally relevant to electrical field, so that he can deliver a seminar for about 30 minutes. Some of the topics suggested as follows-

- i. Elevators.
- ii. Linear Induction Motor.
- iii. Electric Power Generation from non-conventional energy source.
- iv. Study of small-scale industry (from Entrepreneurship development aspect).

It is preferred that the students' visit an industry/organization to gather the information.

C) Field Work:

Visit the industry for deciding project, seminar topic.

Learning Resources :

A) Web sites for references:

- www.globalspec.com

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Energy Audit & Conservation

Course Code : R10EE5301

Course Category : Specialized

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rationale: An Electrical Engineering Diploma holder has to deal with various aspects of energy related with consumption pattern, energy bill etc. The need of time is to search for energy conservation possibilities in various areas like industrial, commercial, agricultural & domestic sector. In this course the student learns about various energy aspects associated with energy conservation & procedure for energy audit.

Objectives:

The student should be able to

1. Know the importance of the non conventional energy sources, their operation, construction, advantages, disadvantages.
2. Understand the various sources of energy used in the industry for different purposes & importance of energy efficiency.
3. Know the importance of energy conservation in respect to various sectors & the methods of increasing it.
4. Understand the importance of energy audit in the energy conservation process.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 1 | 1.1 Sources of Energy: energy sources, stored & running sources. Non-conventional & conventional energy sources. Their advantages & disadvantages, necessity of conserving resources. Operation of Non-conventional energy sources. 1.2 Energy & Environment Environmental concerns related to energy utilizations, the Green house effect, global warming & its effect, acid rain, concept of green building. | 12 | 16 |
| 2 | 2.1 Energy in Non- Industrial sector: Use of energy in agricultural sector, commercial sector, domestic & public sector. Efficiency & energy conservation possibilities. Energy efficient motors. | 10 | 12 |

Course Details :

| | | | |
|---|---|----|----|
| 3 | 3.1 Energy in Industry: Energy sources for industry, comparison of energy sources. Various types of equipments used in industry for motive power, heating, lighting, welding, air conditioning etc. 3.2 Energy efficiency of these equipments. Possible improvement in energy uses. | 12 | 16 |
| 4 | 4.1 Energy Audit: Importance for energy conservation. Principle of energy audit. 4.2 Measurement & Measuring devices: Analysis of data, energy flow diagram, its use in ABC analysis. | 10 | 12 |
| 5 | 5.1 Energy Conservation: Energy conservation using energy audit data in various sectors. Planning of energy conservation programme; equipments used for conservation. 5.2 Preparation of energy audit & conservation report. Payback period. Implementation & monitoring of the project of energy conservation. | 10 | 12 |
| 6 | 6.1 Energy conservation in generation, transmission & distribution. Demand side management concept. Methods of Demand Side Managements. Energy conservation in air conditioning & refrigeration. Introduction to tariff system & application to reduce energy bill. | 10 | 12 |

Teaching Methodology: Chalk Board, Discussion, Power Point Presentations.

Term Work:

A) Skills to be developed:

I) Intellectual Skills:

- Understanding the methodology of energy audit.
- Identify the means of energy conservation.
- Selecting Industry for energy audit & data analysis.
- Select appropriate method of energy conservation for given situation.
- Interpretation of gathered data.
- Report writing of energy audit.

ii) **Motor skills :**

- Measurement of quantities on various meters to perform energy audit.
- Following the safety precautions while taking observations.

B) List of Practical:

A group of students (2 to 5) should prepare an energy conservation project report.

The project should include –

1. Data collection regarding existing location of load.
2. Existing consumption of load & its pattern.
3. Data analysis.
4. Suggestions regarding energy conservation.
5. Calculation of payback period.

The group should visit a small-scale industry or a commercial establishment for this purpose.

Professional Practice:

1. Minimum Two lectures of the experts in the above field may be arranged. The student should write report of the lecture and submit as a part of term-work.
2. Demonstration of energy saving using electric ballast and equipment based on non conventional energy sources is arranged like solar energy or Visit to wind farm be arranged.

Learning Resources:

A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|--------------------|-----------------------------|--------------------------------------|
| 1 | C. L. Wadhva | Energy Audit & Conservation | McGraw Hill Co. |
| 2 | P. Balasubramanian | Energy Auditing Made Simple | Bala Consultancy Services Chennai |

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : High Tension Switch Gear & Protection

Course Code : R10EE5302

Course Category : Specialized

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rationale: A Diploma holder in a Electrical Engineering is required to perform the maintenance of the electrical apparatus, equipments & the protective switchgear. He has to be able to conduct preventive, routine, breakdown maintenance of the above. After studying this course the student is able to understand the working of the various switch gear, types of the gear, relays, meter.

Objective:

The student will be able to

- 1 Understand the necessity, construction working of various types of circuit breakers.
- 2 Understand the principles of protection.
- 3 Understand the schemes of protection for major electrical equipments like transformer, generator etc.
- 4 Know about static relays & Numerical Protection System.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | <p>1.1 Fundamentals of protective relaying: Need for protective relaying systems, nature & causes of faults, types of faults, effects of faults, evolution of protective relaying, zones of protection, primary & backup protection. Essential qualities of protective relaying. Trip circuit of circuit breaker, zone of protection.</p> <p>1.2 Various operating principle of protection- over current , directional over-current, differential, distance induction type relay, current & time setting in induction relay.</p> | 12 | 16 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 Fundamentals of Arc interruption: Current interruption in AC circuit breaker, high & low resistance principles. Arc interruption theories. Arc voltage , recovery voltage , derivation & definition of restricting voltage & RRR voltage, resistance switching, current chopping, interruption of capacitive current.</p> <p>2.2 Principle of HVDC System : Equipments used, General block diagram, specific requirements of HVDC Switch Gear.</p> | 10 | 12 |
| 3 | <p>3.1 Circuit Breakers: Different ratings of Circuit breaker like rated voltage, rated current, rated breaking capacity-Symmetrical & Unsymmetrical breaking, rated interrupting duties, making capacity , short time rating etc.</p> <p>3.2 Classification of HT circuit breaker: Constructional features & working of Air Blast circuit breaker, OCB, SF6 Circuit breaker, VCB- Their disadvantages & applications, Auto Reclosing.</p> <p>3.3 Introduction to Gas Insulated Substation.</p> | 12 | 16 |
| 4 | <p>4.1 Transformer Protection: Types of faults in Transformer, Differential protection in transformer. Buchholz Relay-Construction & Operation, Protection against over fluxing, over voltage.</p> <p>4.2 Generator Protection: Various faults –Abnormal Operating conditions, Stator faults, Differential Protection for stator, rotor faults, protection for rotor faults, protection against unbalanced loading, over speed & loss of excitation.</p> <p>4.3 Bus Bar Protection: Different protections for bus bars, selection of CT ratios for busbar protection. High impedance differential relay.</p> | 10 | 12 |
| 5 | <p>5.1 Feeder protection : Using definite & inverse time over current relay, time graded & current graded system of protection.</p> <p>5.2 Introduction to distance protection, Simple impedance relays, three step distance protection.</p> <p>5.3 PLCC: need of PLCC, different equipments of PLCC, Carrier Aided type of protection line.</p> | 10 | 12 |
| 6 | <p>6.1 Static Relays: Introduction & definition, block diagram of static relay, different component of static relay. Merits & demerits of static relays over conventional relays</p> <p>6.2 Introduction to Microprocessor based relays, Microprocessor based over current relay scheme- block diagram description.</p> <p>6.3 Numerical Protection: Introduction, block diagram & description of numerical relays.</p> | 10 | 12 |

Teaching Methodology : Chalk Board, Discussion, Power Point Presentation, Transparencies.

A) Term work :

Skills to be developed:

i) Intellectual Skills:

- Identify various types of HV circuit breakers.
- Selection of Circuit breaker depending on application.
- Understanding various types, construction , working of H.V. circuit breakers, relay, protection scheme, GIS & other H. V. components.

ii) Motor Skills:

- Connecting the instrument as per given diagram.
- Measure various quantities on various meters.
- Draw Graph of quantities indicated by meters.

B) List of Practical/Experiments/Assignments:

The term work shall consist of the following assignments

1. Study of Air Circuit Breaker.
2. Study of Oil Circuit Breaker.
3. Study of SF6 Circuit Breaker.
4. Study of Vacuum Circuit Breaker.
5. Study of Buchholz Relay.
6. Study of Static Relay.
7. Characteristics of Over current relay.
8. Characteristics of Over Voltage relay.
9. Study of differential protection of transformer.
10. Merz- Price protection of Alternator.

C) Student should visit the EHV substation/ GIS substation and submitted the visit report as a part of term work .

D) Professional Practice:

Student should collect the Data Sheets of Various HT Switchgear components and make a comparative statement and submit it as a part of Above Term Work.

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Learning Resources:

A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|----------------------------|---|--|
| 1 | S. S. Rao | Switch Gear Protection & Power Systems | Khanna Publicatios , New Delhi |
| 2 | M. V. Deshpande | Switch Gear & Protection | Tata McGraw Hill Publishing Company , New Delhi. |
| 3 | Y.G.Paithankar & S.R.Bhide | Fundamentals of Power System Protection | Prentice Hall Of India, New Delhi |
| 4 | DR. S.L. Uppal | Electrical Power | Khanna Publicatios , New Delhi |

B) Web sites for references :

1. www.suzlon.com

2. www.cglonline.com

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Programmable Logic Controller Course Code : R10EE5303

Course Category : Specialized Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rational:

Today's industry is automation industry. Most of the equipments are automated for better performance & higher productivity. It's using Programmable logic controllers for these purposes. An Electrical Diploma holder is supposed to work smoothly with PLC. This course will provide that sufficient knowledge to a student of Electrical Engineering about PLC.

Objectives:

The student will be able to

1. Know the elements of PLC.
2. Understand the various basic concepts of PLC.
3. understand the logic in building of the ladder network.
4. Understand the module system of PLC.
5. Know the use of processor as PLC.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Programmable logic controller: Introduction to programmable logic controller, Block diagram of PLC-description , hardware, types. | 10 | 12 |
| 2 | Programmable logic controller- operation: concept of digital operation, concept of binary operation, binary data representation, input/output status files, 8 bit & 16 bit input signals Interfacing & memory system. | 10 | 12 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 3 | Introduction to logic: conventional ladder versus Programmable logic controller ladder, operation of logic functions like AND, OR, NAND, NOR, EX-OR. Analysis of logic systems, Combination of logic elements for required systems. | 12 | 16 |
| 4 | Input/ output modules: specification of input modules & AC & DC Input modules. Input module operation, Interfacing of signals with input modules, Analog & digital inputs, Types of output modules like relay, transistor-transistor logic. | 10 | 12 |
| 5 | Programmable logic controller processors: The processor function, operation system of processor, processor parts, serial communication between computer & programmable logic controller. Battery backup system, choosing correct processor for required operations. | 10 | 12 |
| 6 | Programmable logic controller instructions: Instruction for relay operations, Instruction for timers , counter operations , Data handling instructions, Overview of instruction system for GE/FANUC/ROCKWELL/MISTUBISHI Programmable logic controller, Conversion of ladder diagram for machine controllers, Introduction to PLC instruction set. Concept of SCADA, its block diagrams & working. | 12 | 16 |

Teaching Methodology: Chalk Board, Discussion, Power Point Presentation, Transparencies, Demo.

A) Term Work:

Skills to be developed

I. Intellectual Skills:

- Understanding the architecture of PLC & functioning of various parts.
- Selection of appropriate instructions for proper application.
- Interpretation of the errors in program.
- Understanding the development of programs & theory behind the control.

ii) Motor Skills:

- Proper connection.
- Entering the program correctly.
- Execution of the program.
- Testing of the program for the logic used.
- Observe the result.

B) List of Practical/Experiment/Assignment:

The term work shall consist of any eight experiments from the following list.

1. Simulation of at least three different operations on programmable logic controller kit using temperature/ liquid level / flow transmitted signals.
2. Preparation of simple ladder diagram for machine using contactor logic & converting it to Programmable logic controller system.
3. Visit to industry applying Programmable logic controller for their operation & to prepare a visit list.

Learning Resources:

A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-------------------|---|-----------------------|
| 1 | Gary Dunning | Introduction To PLC | Thompson Publications |
| 2 | Richard Webb | PLC Control Systems | - |
| 3 | A.K. Mukhopadhyay | Microprocessor, Microcomputers & their applications | Narosa Publications |

B) Magazines

Electrical India (Chari Publication).

C) Web sites for references:

www.wikipedia.org

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Non Conventional Energy Sources Course Code : R10EE5304

Course Category : Specialized

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rationale: Due to the extensive use of energy the conventional energy sources like fossil fuel are depleting very fast & the thrust is to be given on non conventional energy sources for power generation. An Electrical Engineer should be aware of methods of extracting energy from Non Conventional energy sources like Solar, Wind, Geothermal etc.

Objective:

The student will be able to

1. Understand the various methods of energy conversion from solar energy & its application.
2. Understand the various methods of energy conversion from wind energy & its application.
3. Know about the methods of energy conversion from ocean energy, geothermal energy, biomass & other sources of non conventional energy.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | <p>1.1 Need of Non conventional energy sources : Classification of energy sources, their advantages & disadvantages.</p> <p>1.2 Solar energy: Solar radiation & its measurement, Solar energy collectors, their types & characteristics, Heating application of solar energy in water heating, space heating, distillation, cooking etc.</p> <p>1.3 Solar thermal power generation using parabolic reflector & holistic reflector. Solar PV power generation system, Equipments required & their operation. Economics of solar energy use.</p> | 12 | 16 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 2 | <p>2.1 Wind energy: Principle of wind energy conversion, site selection consideration.</p> <p>2.2 Classification of wind energy conversion system- Basic components of wind energy conversion system, types of wind machines, generating system & energy storage, application of wind energy.</p> | 10 | 12 |
| 3 | <p>3.1 Energy from Biomass: Biomass conversion technologies- wet process & dry process. Biogas generation, classification, construction, & operation of biomass plant Advantages & disadvantages of bio energy process.</p> | 10 | 12 |
| 4 | <p>4.1 Geothermal energy: Technology for generation of energy in geothermal plants. Nature of geothermal fields. Prime-movers for geothermal energy conversion. Advantages & disadvantages of geothermal energy.</p> <p>4.2 Introduction to Hydrogen energy: Methods of Hydrogen production. Hydrogen storage & transportation. Hydrogen as alternative fuel for vehicles.</p> | 10 | 12 |
| 5 | <p>5.1 Energy from Oceans: Ocean thermal energy conversion processes(OTEC), open cycle & closed cycle system.</p> <p>5.2 Energy from tides: Basic principle components & operational methods of tidal power plant, Wave energy conversion devices.</p> <p>5.3 Mini & micro hydal power generation: components of small hydroelectric power generation schemes. Advantages & its limitations.</p> | 12 | 16 |
| 6 | <p>6.1 Chemical energy sources Fuel cells- Principle of operation, construction, advantages & disadvantages. Batteries- Different types of batteries used for bulk energy storage.</p> <p>6.2 Additional non-conventional energy sources: Principle of operation of MHD, Thermoelectric, Thermionic power generation.</p> | 10 | 12 |

Teaching Methodology: Chalk Board, Discussion, Power Point Presentation
Transparencies.

A) Term work:

Skills to be developed:

i) Intellectual Skills:

- Identify various nonconventional energy sources.
- Discrimination the Non conventional source on the basis of merits & demerits.
- Understand the feature of various non conventional energy sources.
- Writing a report based on industrial visit.

ii) Motor Skills

- Observation of the system at non conventional power generation.
- Drawing the schematic diagram.

B) List of Practical/Experiments/Assignments: (Minimum Three):

The term work shall consist of the following assignments.

1. Location of plants & its site selection criterion.
2. Equipments used & their specification.
3. Process details.
4. Performance parameter analysis.

Professional Practices:

Students should visits to any two non conventional energy generating system/plants & prepare a visit report and submit it as part of above term work.

Learning Resources:

A) Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|---------------|---------------------------------|--------------------------------------|
| 1 | G.D. Rai | Non Conventional Energy Sources | Khanna Publishing Company, New Delhi |
| 2 | — | Energy Handbook | Tata McGraw Hill |
| 3 | S.P. Sukhatme | Solar Energy | Tata McGraw Hill |

B) Web sites for references:

1. www.suzlon.com
2. www.cglonline.com

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Microprocessors and Microcontrollers

Course Code : R10EE5305

Course Category : Specialized

Credits : 06

Teaching and Examination Scheme :

| Teaching Scheme | | Examination Scheme | | | | | | |
|-----------------|----|--------------------|----|------|----|----|----|-------|
| TH | PR | PAPER HRS | TH | TEST | PR | OR | TW | TOTAL |
| 4 | 2 | 3 | 80 | 20 | - | 50 | 25 | 175 |

Rationale:

Today microprocessors and microcontrollers have become an integral part of all automatic and semi automatic machines. Therefore there is a growing need of engineers / technicians in this field. Hence, it is necessary to study microcontroller basics, hardware and its programming.

This subject covers microprocessor 8085 and microcontroller 8051 architecture, its instruction set , programming and applications. After completing this subject the student can write and execute programs for microcontrollers and microprocessors based applications.

Objectives:

The student will be able to

1. Describe architecture and operation of microprocessor 8085.
2. Develop assembly language programs using instruction set of 8085.
3. Describe architecture and operation of microcontroller 8051.
4. Develop assembly language program using instruction set of 8051.
5. Design and develop microcontroller based systems.

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 1 | Microprocessor 8085 1.1 Evolution of microprocessor. 1.2 Architecture of 8085. 1.3 Pin diagram. 1.4 Control signals. 1.5 Multiplexing of a Address & Data bus. | 10 | 12 |

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Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|--|-------|-------|
| 2 | 8085 Assembly Language Programming 2.1 Programming Model of 8085. 2.2 Addressing Modes. 2.3 Instruction classification , Instruction format. 2.4 Instruction set. 2.5 Stacks and subroutine. 2.6 Assembly Language programming. | 8 | 12 |
| 3 | Microcontroller Basics 3.1 Introduction and applications. 3.2 Comparison between microcontrollers and microprocessors. 3.3 Evolution of microcontrollers. 3.4 Commercial microcontroller devices. 8051 Architecture 3.5 Block diagram of 8051 Microcontroller. 3.6 Registers in 8051. 3.7 General purpose or working registers. 3.8 Stack pointer and Program counter. 3.9 Special function registers (SFR). 3.10 Program Status word. 3.11 Data pointer(DPTR). 3.12 Timer registers. 3.13 Ports. 3.14 Control registers. | 12 | 16 |
| 4 | 8051 connections, I/O ports and memory organizati 4.1 8051 pin connection. 4.2 8051 connections. 4.3 Parallel I/O ports. 4.4 Memory organization. 8051 addressing modes and instructions 4.5 8051 addressing modes. 4.6 8051 instruction set. 4.7 8051 assembler and assembling 8051 program. 4.8 Software simulators of 8051. 4.9 8051 instruction and simple programs. | 12 | 16 |
| 5 | 8051 interrupts, timer/ counters and serial communication 5.1 Interrupts in 8051. 5.2 Initializing 8051 interrupts. 5.3 Interrupt priorities. 5.4 Timers and counters, timer counter modes. 5.5 Serial communication, serial communication modes. | 10 | 10 |

Course Details :

| UNIT | NAME OF THE TOPIC | HOURS | MARKS |
|------|---|-------|-------|
| 6 | Application of microcontrollers 6.1 Square wave and rectangular wave generation. 6.2 Pulse generation. 6.3 Pulse width modulation. 6.4 Frequency counter. 6.5 Interfacing small keyboards. 6.6 Interfacing LCD display. 6.7 Interfacing D/A and A/D converters. 6.8 Interfacing relay. 6.9 Interfacing stepper motor. 6.10 Interfacing DC motor. | 10 | 12 |

Teaching Methodology: Chalk Board, Discussion, Power Point Presentation, Transparencies, Demo.

A) Term Work :

Skills to be developed:

i) Intellectual Skills:

- Understanding the architecture of the processors.
- Understanding the modes & instructions of 8085 & 8051.
- Understanding the applications.

ii) Motor Skills:

- Proper connection.
- Entering the program correctly.
- Execution of the program.
- Testing of the program for the logic used.

Observe the result.

B) List of Practical /Experiment/Assignment:

Using microprocessor 8085 kit:

- 1 Demonstration and study of microprocessor kit.
- 2 Program for addition of and subtraction of two hexadecimal numbers.
- 3 Program for finding largest / smallest number.
- 4 Program for arranging numbers in ascending / descending order.
- 5 Program for 16 bit addition.
- 6 Program for data masking.
- 7 Program for multiplication of two eight bit numbers.
- 8 Program for using JMP Instruction.
- 9 Two programs using loop & Counter.

Using Microcontroller 8051

1. Demonstration and study of microcontroller kit.
2. Demonstration and use of software simulator / assembler.
3. Programming example (any two) – Data transfer instructions.
4. Programming example (any two) – Logical Operation.
5. Programming example (any two) – Jump and Call Instructions.
6. Demonstration and testing of the following applications(any four)
 - Keyboard Interface.
 - LCD display Interface.
 - D/A or A/D converter Interface.
 - Stepper motor control.
 - DC motor control.
 - Any other practical application using microcontroller 8051.

Learning Resources: A)Books:

| SR.No. | AUTHOR | TITLE | PUBLISHER |
|--------|-----------------|---|---|
| 1 | Ajay V Deshmukh | Microcontroller theory & applications | TMH, New Delhi. |
| 2 | Kenneth J Ayala | 8051 microcontrollers architecture , Programming and Applications | International Thompson publishing India. |
| 3 | B. Ram | Microprocessor, Microcomputers | S. Chand Publications. |
| 4 | Ramesh Goankar | Microprocessor Architecture, Programming, and Application with the 8085 | Penram International Publishing (India) Pvt. Ltd. |