Course No.	Course title	L	T	P/D	Hours	Credits
CES-121	Engineering Mathematics-II	3	1	0	4	3

Ordinary and Partial Differential Equations: First order equation (linear and nonlinear), Second order linear differential equations with variable coefficients, Variation of parameters method, higher order linear differential equations with constant coefficients, Cauchy- Euler's equations, power series solutions, Legendre polynomials and Bessel's functions of the first kind and their properties, Separation of variables method, Laplace equation and its application to engineering problem.

Integral Transform: Laplace transforms of standard functions and their properties, Properties of Inverse Laplace transforms, Convolution Theorem and its application.

Probability and Statistics: Definitions of probability and simple theorems, conditional probability, Bayes Theorem, random variables, discrete and continuous distributions, Binomial, Poisson, Gaussian and normal distributions, correlation and linear regression, Probability density function, Types of error, methods of error analysis, uncertainty analysis, statistical analysis and rejection of data.

Books

1) Elementary Differential Equations and Boundary Value Problems 9th Edition by Richard C. Diprima, William E. Boyce
2) Vector Calculus by Michael Corral
3) Probability and Statistics for Programmers by Allen B. Downey, published by O'Reilly Media

Course No.	Course title	L	T	P/D	Hours	Credits
CES-122	Physics for Civil Engg.	3	1	0	4	3

Properties of Matter: Properties of matter: Stress, Strain, Hooke's Law, Types of moduli of elasticity, Torsional pendulum, Determination of Rigidity modulus of a wire, bending of beams, expression for bending moment, Measurement of Young's modulus by uniform and Non-uniform bending.

Hydrodynamics: Continuity and Euler equations, Navier-Stokes equation for viscous fluids, stokes solution in various geometries, drag, stream lines, Stream line flow, Turbulent flow, Poiseuille's formula for flow of liquid through a capillary tube, Determination of coefficient of viscosity of a liquid.

Acoustics: Acoustics: Classification of sound, Simple harmonic motion, vibrations, Characteristics of musical sound, Loudness, Weber-Fechner law , Decibel, Reverberation time, Sabine's formula, Acoustics of buildings, Factors affecting acoustics of building (Optimum reverberation time, Loudness, Focusing, Echo, Resonance and Noise, and their remedies), Measurement of sound absorption coefficient, Sound absorbing materials.

Ultrasonics: Ultrasonics waves, Ultrasonic wave production, Properties of ultrasonic waves, Determination of velocity using acoustic grating Applications of Ultrasonic waves, Magnetostriction method, Piezoelectric method, SONAR, Acoustics of grating.

Mechanics and Theory of Relativity: Displacement, velocity and acceleration in polar and spherical coordinate systems, inertial and non inertial frames, Michelson and Morley experiment, postulates of special theory of relativity, Lorentz's space- time transformations and their consequences, velocity transformations, mass variation with velocity, mass energy equivalence, momentum and energy transformations.

Laser: Laser: Basic Principle, Einstein theory, Characteristics of laser, Nd: YAG laser, CO_2 laser, Semiconductor laser (homo junction), Determination of wave length of laser using grating, Particle size, Application:

Books
1. Avadhanulu M.N. and Kshirsagar P.G., "A Text Book of Engineering Physics", S.Chand & Company Ltd., 7th Enlarged Revised Ed., 2005
2. Gaur R.K. and Gupta S.L., "Engineering Physics", Dhanpat Rai Publishers, New Delhi, 2001
3. Arumugam M., "Engineering Physics", Anuradha Agencies, Kumbakonam, 2nd Edition, 2005
4. Pillai S.O., "Solid State Physics", New Age International Publications, New Delhi, 6th Edition, 2005
5. Palanisamy P.K., "Physics for Engineers", Scitech Publications (India) Pvt. Ltd., Chennai, 2nd Ed., 2005
6. Chitra Shadrach and Sivakumar Vadivelu, "Engineering Physics", Pearson Edu., 1st Ed. New Delhi, 2007.

Course No.	Course title	L	T	P/D	Hours	Credits
CED-123	Basic Electrical & Electronics	3	1	0	4	3

Electric Circuits - Introduction to linear circuits, circuit elements, various sources and source transformation, star delta transformation, solution of D.C. circuits using Kirchoff's laws, signal wave forms and passive elements specifications, generation of A.C. sinusoidal voltage and currents, average and r.m.s. values, Form factor and peak factor, passive elements and their combination in series and parallel, single phase and three phase, introduction to domestic wiring.

Basic concept of Electrical Machines - Self and mutual inductances, Faraday`s laws, Lenz`s Law, statically and dynamically induced emfs, energy stored in magnetic fields. Basic Principle of A.C. and D.C. machines.

Measuring Instruments and Transducer- Introduction to galvanometer (Moving coil and moving iron) Ammeter, voltmeter, wattmeter, energy meter, Transducers**:** Introduction, classification, Basic requirements, Electrical transducers - Resistive, Inductive and capacitive transducers, Thermoelectric and Piezoelectric transducers, Electromechanical transducers, Photoelectric transducers, Digital transducers, MEMS sensor, Non electrical transducers for measuring displacement, strain, vibration, pressure, Flow, temperature, force, liquid level, Humidity, P. H. value, acceleration, transducers, Hall effect transducers.

Data Acquisition and Conversion: Introduction, signal conditioning of the inputs, single channel D A S, Multi-channel D A S, Data Conversion, Multiplexer and S/H circuit, A/D converter.

Semiconductors - Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors, Charge Densities in Semiconductors, Mass action Law, Current Components in Semiconductors, The Continuity Equation, Injected minority Charge Carrier, Hall effect.

PN Junction Diode - Characteristic and analysis, Types of diodes – Zener diodes, Photodiodes, Light emitting diodes (LED's). Rectifiers and filter circuit: Half wave, full wave and Bridge rectifier circuits.

Transistors - Construction and characteristics of bipolar junction, transistors (BJT's)-Common Base, Common emitter, Common Collector configuration. Introduction to JFET and MOSFET

Books
1. Electronics Devices and Circuit Theory by R. Boylestad
2. Electronics Devices and Circuit by G.K. Mithal
3. Electrical Engineering Fundamentals by Vincent Del Toro, PHI Publication
4. Basic Electrical Technology by A.E. Fitzgerald, McGraw Hill Publication
5. Transducers and Instrumentation of by D.V.S. Murty (PHI)India.
6. A course in Electrical & Electronic Measurements & Instrumentation by A.K.Sawhney.

Course No.	Course title	L	T	P/D	Hours	Credits
CED-124	Engg. Thermodynamics	3	1	0	4	3

LAWS OF THERMODYNAMICS: Heat and work, zeroth law First law for control mass (closed system), internal energy, enthalpy, specific heats, non-flow processes of idea1 gases, cyclic process, first law for control volume (open system), general energy equation, one dimensional steady flow, Limitations of first law of thermodynamics, Kelvin-Planck and Clausius statements, their equivalence, reversible processes, reversible cycles, and Carnot cycle, corollaries of the second law, thermodynamics temperature scale, Clausius inequality, entropy, principle of increase of entropy, isentropic efficiency. internal energy, enthalpy, entropy and specific heats, Joule Thomson coefficient

SECOND LAW OF THERMODYNAMICS: Limitations of first law of thermodynamics, Kelvin-Planck and Clausius statements, their equivalence, reversible processes, reversible cycles, and carnot cycle, corollaries of the second law, thermodynamics temperature scale, Clausius inequality, entropy, principle of increase of entropy, availability and irreversibility.

PROPERTIES OF STEAM: Phase transformation, phase diagram, generation of steam, condition of steam-saturated steam, dry-saturated steam, wet steam, superheated steam, dryness fraction, property of steam, steam tables, methods of determination of dryness fraction of steam, use of Mollier charts , process of vapours and various process.

GAS AND VAPOUR POWER CYCLE: General terms, Otto cycle, diesel cycle, dual cycle, working of 4 stroke petrol & diesel engines, working of 2 stroke petrol engine. Brayton cycle, Rankine cycle.

MIXTURES OF GASES AND VAPOUR: Introduction, Ideal gas mixtures, The gibbs Dalton law, General relationships, illustrative examples, volumetric and Gravimetric analysis, Mixture of gas and vapour, Psychrometric terms, Thermodynamic Wet Bulb temperature, Temperature of adiabatic Saturation Enthalphy of moist air.

Application of Thermodynamics in Civil Engineering.

BOOKS:
1. Engineering Thermodynamics : P.K. Nag
2. Engineering Thermodynamics : Yunus Cengel
3. Engineering Thermodynamics : Van Wylen

Course No.	Course title	L	T	P/D	Hours	Credits
CED-125	Engineering Graphics	1	0	3	4	3

Introduction (Minimum 1 Sheet): Importance, Significance and Scope of Engineering Graphics, General Introduction to Drawing Instruments and their Use, Introduction to IS code of drawing. Layout of Drawing Sheets, Principle of Dimensioning and Scaling, Lettering: Single Stroke Vertical and inclined Letter, Line types such as Elevation lines- Construction lines – Section lines – Hidden lines –Centre lines.

Orthographic Projections (Minimum 4 Sheets): Simple orthographic projections, first and third angle, Projection of points and lines in different quadrant, Traces, Inclinations, True lengths of line, Projection on auxiliary plane, Shortest distance, Intersecting and Non Intersecting lines. Planes other than reference planes – perpendicular and oblique planes, traces, inclinations etc. , projection of lines lying in the plane, conversion of oblique plane into auxiliary plane and related demonstrative problems. Different cases of plane figures of different shapes and making different angles with one or both reference planes and lines lying in the plane figure making different given angles, Obtaining true shape of the plane figure by projection. Projection of solids, simple cases of solids placed in different positions, axes faces and lines lying in the faces of solids making given angles, Development of surfaces – development of simple objects like Tetrahedron, Cube, Octahedron, Square based pyramid and Pentagonal based prism, Introduction to Isometric Projections.

Sections of Solids (Minimum 2 Sheets): Importance, Principles, Types, Cutting plane representation, section lines and conventional practices, Demonstrative examples showing sections of Cube, Cylinder, Cone, Pyramid and Prism

Graphics (Minimum 1 Sheet): Determination of various Reactions in Beams and Trusses by Graphical Methods (Funicular and Maxwell diagrams)

CAD (Minimum 2 Sheets): Introduction to CAD tools – basics, The User Interface, Start, Organize, and Save a Drawing, Control the Drawing Views, Display Multiple Views in Model Space, 2D tools & commands of CAD software, Creating Drawings & Using text, Use of Drawing and modify toolbar, Grouping of Objects, Complete 2D drawing, Drawing and modify toolbar for 3D drawing, Work on three dimensional objects.

Books

1) Engineering Drawing and Graphics + Auto CAD – K. Venugopal. New Age International Publishers

2) Engineering Drawing - N.D. Bhat and V.M.Panchal. Charotar Publishing House

3) Engineering Drawing - P.S. Gill. S.K. Kataria & Sons Publishers

Course No.	Course title	L	T	P/D	Hours	Credits
CED-126	Engineering Physics Lab	0	0	3	3	1

List of Experiments:

1) To find the resistance of a given wire using a post office and hence to determine the specific resistance of the material of wire.

2) To find the area of the rectangle by using sextant.

3) To convert a Weston type galvanometer into a voltmeter of a given range 03 volt.

4) To verify inverse square law of magnetism using magnetometer.

5) To study the variation of magnetic field with distance along the area of circular coil carrying current.

6) To find the refractive index of material of given prism using a spectrometer.

7) To determine the wavelength of laser light using transmission grating.

8) To find the wavelength of sodium light by measuring the diameter of Newton ring.

9) To find the value of Planck's constant and photo electric work fraction of the material of the cathode using a photo electric cell.

10) To find the velocity of ultrasonic velocity in liquid with interferometer.

11) To find numerical aperture of optical fibers.

12) To determine the resolving power of the plane transmission grating.

13) To find the magnifying power of a telescope by linear method.

Course No.	Course title	L	T	P/D	Hours	Credits
CED-127	Electrical & Electronics Lab	0	0	3	3	1

Electrical

1. Power measurement in 3 phase systems using two-wattmeter method (star connected)

2. Verification of kirchoff's laws

3. Measurement of choke coil parameters using 3 voltmeter & 3 ammeter method.

4. Magnetization characteristics of a dc shunt machine, determination of critical field resistance and critical speed.

5. Open circuit and Shortest Circuit on any 1 phase transformer.

6. Load test on 1-phase transformer.

7. Regulation of 3 phase synchronous generator using OC and SC test.

8. Brake test on 3 phase squirrel cage induction motor.

9. Calibration and testing of single phase energy meter.

10. Calibration of dynamometer type power factor meter.

11. Calibration of PMMC ammeter and voltmeter crompton DC potentio meter.

Electronics

1. PN junction diode characteristics (a) forward bias b) reverse bias

2. Zener diode characteristics

3. Transistor CE characteristics (Input and Output)

4. Rectifier without filters (Full wave & Half wave)

5. UJT characteristics

6. FET characteristics

7. Study of CRO

8. CE amplifier

9. Class A Amplifier

10. RC Phase shift Oscillator

11. Study of logic gates using ICS

Course No.	Course title	L	T	P/D	Hours	Credits
CED-128	Workshop Practice-I	1	0	3	4	2

Carpentry: Introduction to wood working & Carpentry. Seasoning of wood and its types. Classification of Wood. Wood working processes. Introduction and classification of various conventional & portable power operated tools and machines used for wood working. Introduction to various joints. Operations practice like marking, sawing, planning, chiseling, boring, grooving etc. Job practice using portable power operated tools and Joints- Corner joints, Mortise & Tenon joint, Briddle, cross-joint.

Welding: Welding-definition, industrial importance, application; welding vs. other fabrication processes. Classification of welding and allied processes. Hazards associated with gas and arc welding processes, protection against electric shock, flame/arc radiation, fumes and dust, compressed gasses, fire and explosions. Welding Joints & Symbols. Practice job on Arc welding preparation of various joints, practice job on Gas welding. Practice job on Soldering & brazing. Practice job on advance welding.

Bolting: Introduction to various fasteners, industrial importance and application. Definition of nut & bolt and their types. Introduction and classification of tools and machines used in steel fabrication. Tapping & Dieing operations.Safety precautions. Operation practice like; filing, sawing, marking, drilling, tapping, dieing with conventional and power operated tools.

Dress Code; khaki with close shoes.

Text and Reference books:

1) Hajra Choudhury, Hazra Choudhary and Nirjhar Roy, 2007, Elements of Workshop Technology, vol. I, Media promoters and Publishers Pvt. Ltd.

2) W A J Chapman, Workshop Technology, 1998, Part -1, 1st South Asian Edition, Viva Book Pvt Ltd.

3) P.N. Rao, 2009, Manufacturing Technology, Vol.1, 3rd Ed., Tata McGraw Hill Publishing Company.