CES-121 Engineering Mathematics – II

L	T	P
3	1	0

Unit I

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.

Unit II

Integral Transform

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

Unit III

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

CES-122 Physics for Civil Engg.

L	T	P
3	1	0

Unit I - 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.

Unit II - 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.

Unit III - 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.

Unit IV - 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.

Unit V - 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.

Unit VI - Laser

Laser: Basic Principle, Einstein theory, Characteristics of laser, Nd: YAG laser, CO2 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, Second Edition, 2005
6. Chitra Shadrach and Sivakumar Vadivelu, "Engineering Physics", Pearson Education, 1st Edition, New Delhi, 2007.

CED-123 Basic Electrical & Electronics

L	T	P
3	1	0

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.

Semi-conductor Devices: 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.

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, Photoelectric transducers, Non electrical transducers for measuring displacement, strain, vibration, pressure, Flow.

Electric Circuits - Introduction to linear circuits, circuit elements, solution of D.C. circuits using Kirchoff's laws, signal wave forms and passive elements specifications, average and r.m.s. values, Form factor and peak factor, passive elements and their combination in series and parallel,

Basic concept of Electrical Machines - Self and mutual inductances, Faraday`s laws, Lenz`s Law, induced emfs. Basic working Principle of A.C. and D.C. machines.

Books

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

CED-124 ENGG. THERMODYNAMICS

L	T	P/D	Cr
3	1	0	4

1. 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

2. **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.

3. **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.

4. **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.

5. **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.

6. Application of Thermodynamics in Civil Engineering.

BOOKS RECOMMENDED:

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

CED-125 Strength of Materials

L	T	P
3	1	0

Simple Stresses and Strains

Stress & strain, Types of stresses and strains in Elastic body, Hooks law, Stress – strain diagram for ductile and brittle material, Elastic constants and their relationships, Thermal Stress & Strain, Stresses induced due to uniaxial stress, stresses induced by state of simple shear, stresses induced due to biaxial stress, Transformation of Plane Stress and strains, Principal Stresses and strains, Maximum Shearing Stress and strain, Analytical and graphical methods: Mohr's Circle.

Centre of Gravity and Moment of Inertia

Centroid and centre of mass: Centroids of composite plane figures and curves, Centre of Gravity and Moment of Inertia: First and second moment of area; Radius of gyration; Parallel and perpendicular axistheorem; Product of inertia, Rotation of axes and principal moment of inertia; Moment of inertia of simple and composite bodies. Mass moment of inertia.

Beam under Transverse Loading

Shear force and bending moment, Relationship between load, shear force and bending moment, Shear force and bending moment diagrams for Types of Load – Concentrated, uniformly distributed, uniformly varying load and Combination of loads and Types of beams –

Cantilever beam, simply supported beam, overhanging beam, Point of contra flexure, Using singularity functions to determine shear and bending moment in a beam, Equation of the elastic curve, Direct determination of the elastic curve from the load distribution and method of superposition.

Stresses in Beam

Pure bending of beams, Moment of resistance, Section modulus & neutral axis, Stress distribution in symmetric and unsymmetrical sections, Concept of direct & transverse shear stress, Response under of axial and eccentric load, direct stresses, bending stresses, General case of eccentric axial loading, Determination of the shearing stresses in a beam, Shear Center, Shearing Stresses in Common Types of Beams, Distribution of stresses in a narrow rectangular beam, Longitudinal shear on a beam element of arbitrary shape.

Torsion

Theory of Pure torsion, Derivation of Torsion equation for a circular shaft subject to torsion, Maximum torque transmitted by a Solid and hollow shaft, Power transmitted by a shaft, Close coiled helical spring subjected to axial load and axial torque, Polar modulus, torsion rigidity, Shear stress produced in the members.

Thin &Thick Cylinders and Spheres

Thin and Thick cylinders subjected to internal pressures, Concept of stresses & strains, Hoop stress, Longitudinal stress, in a cylinder, principal stresses in sphere and change in diameter and internal volume.

Columns & Struts

Stability of Structures, Euler's Formula for Pin-Ended Columns, Extension of Euler's Formula to Columns with Other End Conditions, Eccentric Loading; the Secant Formula, Columns under a Centric Load and Eccentric Load, Rankin's Theory.

Books

1. Ferdinand Beer, E. Russell Johnston, John DeWolf, David Mazurek , Mechanics of Materials, 7th Edition, McGraw-Hill Engineering.
2. Gere and Timoshenko, Mechanics of Materials, 4th Edition, PWS Publishing Company.
3. R.C.Hibbeler,Mechanics of Materials,Pearson.
4. E.P.Popov,Engineering Mechanics of Solids,Pearson.
5. I.H.Shames&J.M.Pitarresi, Introduction To Solid Mechanics,PHI
6. S.H.Crandall,N.C.Dahl&T.J.Lardner,Mechanics of Solids,TATA McGraw Hill Education
7. M.A.Jayaram,Mechanics of Materials with Programs in C,PHI.
8. B.C.Punmia.Ashok Kumar Jain&Arun Kumar Jain,Strength of Materials,Laxmi.

9. S. Ramamrutham, R. Narayan, Strength of Materials, DhanpatRai Publishing Company (P) Limited.

CED-127 Electrical & Electronics Engineering Lab

L	T	P
0	0	3

Electronics

1. Familiarization of electronic components.
2. PN junction diode characteristics (a) forward bias b) reverse bias
3. Study of Zener diode characteristics
4. Study of half wave Rectifier without filters.
5. Study of full wave Rectifier without filters.
6. Study of Characteristics of Transistor - Common base.
7. Study of Characteristics of Transistor - Common collector
8. Study of Characteristics of Transistor - Common emitter

Electrical

1. Verification of KCL & KVL (kirchoff's laws)
2. Calibration of ammeter and voltmeter.
3. Calibration of wattmeter.
4. Calibration and testing of single phase energy meter.

Workshop Practice –I

CED-128 **L T P Credit**
1 0 3 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:

- Hajra Choudhury, Hazra Choudhary and Nirjhar Roy, 2007, Elements of Workshop Technology, vol. I, Media promoters and Publishers Pvt. Ltd.
- W A J Chapman, Workshop Technology, 1998, Part -1, 1st South Asian Edition, Viva Book Pvt Ltd.
- P.N. Rao, 2009, Manufacturing Technology, Vol.1, 3rd Ed., Tata McGraw Hill Publishing Company.