20BS01 Linear Algebra and Univariate Calculus

Teaching scheme
Lectures: 3 hrs/week
Tutorial: 1 hr/week
Number of Credits :4

Examination schem
In-Sem Exam: **50** Mark
End-Sem Exam: **50** Mark

Course Objectives:

1. To falimiliarize the prospective engineers with techniques in linear algebra and calculus of one variable.
2. To equip the students with standard concepts and tools in Linear algebra and calculus of one variable which will find them useful in their disciplines.

Course Outcomes:

CO1 : Use matrix method to solve linear system of equations, Linear Transformations.
CO2 : Calculate eigenvalues, eigenvectors and apply it to diagonalize a matrix.
CO3 : Apply knowledge of linear algebra to solve simple real life problems.
CO4 : Compute differentiation, series expansion, integration of function of one variable.

Title of the Unit, Brief Description of Course Contents: **Contact Hours (Lectures)**

Unit-I: Matrices **(06)**

Rank of a matrix, Echelon form, System of linear equations, Euclidean vector spaces and Linear Transformations

Unit-II: Diagonalization of a Matrix **(06)**

Eigenvalues, Eigenvectors, Properties of Eigenvalues, Diagonalization of a matrix.

Unit-III: Applications of Linear Algebra **(08)**

Introduction to Modular Arithmetic, Euclid's algorithm, Encrypt and decrypt the statement using matrix, Applications to simple real life problems.

Unit-IV: Differential Calculus **(06)**

Successive differentiation, nth order derivatives of some standard functions, Taylor's and Maclaurin's theorem, Standard series expansions.

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Unit-V: Integral Calculus **(08)**

Reduction formulae, Beta Function, Gamma function, Differentiation under integral sign, Error function.

Text-Books :

1. David Poole, **' Linear Algebra: A Modern Introduction'**, 2nd Edition, Brooks/Cole (2005).
2. B. V. Ramana , **'Higher Engineering Mathematics'**, *Tata McGraw-Hill Publications*, (2007).
3. B.S. Grewal, '**Higher Engineering Mathematics**', *Khanna publishers*, Delhi (40th edition), (2008).

Reference Books:

1. C.R. Wylie, L. C. Barrette, *'***Advanced Engineering Mathematics***'*, *McGraw-Hill Publications*, *New Delhi* (6 th edition),(2006)
2. Maurice Weir, Joel Hass, Thomas **'Calculus'** , 12th edition, *Pearson India* (2016)
3. George Thomas, Jr., Ross Finney, Late, **Calculus,** 9th edition, *Pearsons India*
4. Sudhir Ghorpade, Balmohan Limaye, *'* **A Course in Calculus and Real Analysis** *'* , (Undergraduate Text in Mathematics), *Springer* (2006).
5. Erwin Kreyszig, '**Advanced Enginnering Mathematics'**, *Wiley Eastern Ltd*(10th Edition), (2017)

20BS02 Chemistry

Teaching Scheme

Lectures: 3H/week
Credits: 3

Examination Scheme

In-Semester: 50 Marks
End-Semester: 50 Marks

Course Objectives:

The Chemistry course is designed such that the learners imbibe chemical principles relevant in the engineering context. The course facilitates undergraduates to understand chemical processes, methods of analysis, structure-property relationship and evaluate role of chemical substances for engineering applications. Further the course inculcates basic problem-solving skills involving chemistry principles.

Course Outcomes:

The students will be able to –

1. Express chemical changes in the form of suitable chemical reactions.
2. Analyse chemical substances qualitatively and quantitatively.
3. Solve problems by applying chemistry principles.
4. Explain chemical methods, mechanisms and processes of synthesis.
5. Interpret the role of chemical substances in a setup/process.

Module 1: Physical Chemistry **10 L**

1. Chemical Bonding: Types of bonds, intermolecular forces, bonding in molecules: valence bond theory, molecular orbital theory
2. Electrochemistry: Electrochemical cell, Nernst equation, EMF of cell, reference and indicator electrodes, battery characteristics, Lead-acid, Lithium-ion battery, Fuel cell technology.

Module 2: Inorganic and Materials Chemistry **10 L**

1. The Periodic table and properties: Introduction
2. Chemistry of some elements like H, Si, extraction of Si to making a chip, H_2 gas as fuel
3. Engineering materials: Structural features, properties and applications of OLEDs, OFETs, - PPV (- solar cell), Liquid crystal Polymers, Conducting polymers – as a chemical sensor,

Polymer composites – e.g. In Automobiles (Structure, properties and applications).

(i) Introduction to nanomaterials, synthesis by top down and bottom up methods.

(ii) Structure, synthesis and some typical applications of nanomaterials.

Module 3: Analytical Chemistry **13 L**

1. Analysis of substances such as:
    a. Water: hardness in water, TDS, effect of hard water in boilers, water softening techniques – zeolite and ion exchange method. Reverse osmosis. Waste water recycling: testing & removal methods.
    b. C based fuels: Analysis of coal and petrol.
2. Analytical techniques such as pH-metry, Conductometry, Spectroscopy: Basic principle, instrumentation and applications.

Text Books:

1. S.S. Dara 'Engineering Chemistry' S. Chand Publications (2010)
2. B.S. Chauhan 'Engineering Chemistry': Univ Sc Press. (third edition)2009
3. Shashi Chawla 'A Text Book Of Engineering Chemistry': Dhanpat Rai & Co. (2015)
4. Jain and Jain 'A Text Book Of Engineering Chemistry' Dhanpat Rai & Co.
5. Gurdeep Chatwal 'Instrumental methods of Chemical Analysis' Himalaya publication house

20BS02L Chemistry Lab

Teaching Scheme
Pract:2 hrs per week
Number of Credits : 1

Examination Schen
In-SEM Exam : 25 M
End-SEM Exam : N

Course Objectives:

The objective of the Chemistry Lab course is

To develop experimental skills. **To** correlate the properties of a substance based on experimental observations. **To** demonstrate use of analytical techniques for analysing substance for its properties or quality.

Course Outcomes:

By taking this course, the students will be able to —

CO- 1: Identify analytical technique required for performing chemistry experiment.

CO- 2: Prepare and analyse substances based on certain parameters and evaluate their quality (zeolite/ coal/water/ polymer)

CO – 3: Measure observables for a chemical change in the experiment and draw inferences.

CO - 4: Justify the significance of a selected technique/ specific role of a reagent in a given chemical experiment

List of Experiments: (Any 8)

1. To determine Total hardness of water by EDTA Method (complexometric titration).
2. To determine alkalinity of given water sample.
3. Preparation of sodium zeolite and use it for water softening.
4. Estimation of sodium from soft water using flame photometry.
5. To determine concentration and strength of acid from given solution by pH metric titration.
6. To determine concentration of acetic acid in vinegar by potentiometric titration.
7. Conductometric titration to determine concentration of strong acid /base.
8. To determine Molecular weight of a Polymer by viscometric method.
9. Colorimetric estimation of KMnO4.
10. Proximate Analysis of coal.
11. Preparation of biodiesel and its characterization.

20BS03 Multivariate Calculus

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week
Number of Credits: 4

Examination Scheme:
In-Semester: **50** Marks
End-Semester: **50** Marks

Course Objectives:

1. To familiarize the students with techniques of multivariate differentiation and integration.
2. To equip the students to deal with advanced level of Mathematics, and applications that would be essential for their disciplines.

Course Outcomes:

After completion of this course, students will be able to

1. Calculate partial derivatives and apply them to solve problems.
2. Calculate the extrema and constrained extrema to optimize a given function of several variables.
3. Compute the values of double integral, triple integral over the region.
4. Use techniques of double integral, triple integral in various applications.

Course Content:

Unit – I: Partial differentiation (7)

Function of several variables, partial derivatives, Geometrical interpretation of partial derivatives, chain rule, higher order partial derivatives, Euler's theorem.

Unit – II: Applications of partial differentiation. (5)

Maxima, minima and saddle points, second derivative test, constrained extrema and Lagrange's multipliers, applications in optimization of functions of several variables. Applications of first order partial derivatives in data fitting using the method of least squares.

Unit – III: Double integration (7)

Tracing of curves in Cartesian and Polar coordinate system, double integrals over a rectangle, double integrals over regions, change of order of integration, Introduction of Jacobian determinant for two variables, double integral in polar coordinates, The Gaussian integral.

Unit – IV: Triple integration **(8)**

Triple integral over a box, triple integrals by iterated integration, change of variables, Cylindrical and Spherical coordinates, The Jacobian determinant for three variables, evaluation of triple integral.

Unit – V: Applications of Double and Triple integration **(7)**

Applications of double integral and triple integral: Area of plane Lamina, mass of plane lamina, surface area of solid, volume, mass of solid.

Text Books :

1. B. V. Ramana, **'Higher Engineering Mathematics ',** *Tata McGraw Hill Publications,* (2007).

2. B.S. Grewal, **'Higher engineering Mathematics'**, *Khanna publishers, Delhi*(40th edition), (2008).

3. Hughes-Hallett et al., '**Calculus - Single and Multivariable',** *John-Wiley and Sons,* (3rd Edition), (2003).

4. Maurice Weir, Joel Hass, '**Thomas' Calculus'**, *Pearson India*, (13th edition), (2016).

Reference Books:

1. J. E. Marsden, A. J. Tromba and A. Weinstein, '**Basic Multivariable Calculus'**, *Springer,* (3rd edition), (1993).

2. G. B. Thomas and R. L. Finney, '**Calculus and Analytic geometry'**, *Pearson, Reprint* (9th Edition), (2002).

3. Sudhir Ghorpade, Balmohan Limaye, '**A Course in Multivariable Calculus and Analysis'**, (Undergraduate Text in Mathematics), *Springer* (2009).

4. Dennis G. Zill, Warren S. Wright**, 'Multivariable Calculus**, **Early Transcendental'**, *Jones & Bartlett Publisher*(4th edition), (2009).

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20BS04 Physics

Teaching Scheme	Examination Scheme
Lectures 3 Hrs per week	In-SEM Exam : 50 Marks
Number of Credits : 3	End-SEM Exam : 50 Marks

Course Objective:

To introduce undergraduate students of technology to the principles, notions, basic physical ideas, mathematical relations and applications of physical optics, thermodynamics, quantum physics, solid state physics and the properties of nano as well as bulk materials

Course Outcomes:

By taking this course, the learner will be able to —

CO — 1: Apply the laws of Electromagnetic Radiation and Physical Optics to determine the behaviour of dynamic electric fields in situations involving multiple coherent sources superimposed to produce interference, diffraction and polarization patterns.

CO — 2: Apply the laws of Thermodynamics and Statistical Mechanics to determine changes in entropy, behaviour of heat engines, and behaviour of the 'distributions' of particles in thermal equilibrium.

CO — 3: Execute and Justify the use of Quantum Theoretical procedures for figuring out the dynamics of two-state and multi-state micro-systems with reference to different experimental contexts

CO — 4: Apply the band theory of solids to **differentiate** between the electrical, magnetic, mechanical and optical properties of 'nano' materials and of their 'bulk' counterparts

Title of Module, Brief Description of Course Contents and No. of Lectures

Module — 1: Electromagnetic Radiation and Interference: 6 Lectures

Expression for the electric field beyond Coulomb's law; Two dipole radiators and Physics of interference; Mathematical treatment (propagating waves, rotating vectors, complex functions)

Module — 2: Diffraction and Polarization: 6 Lectures

The resultant amplitude due to n equal oscillators; Diffraction Grating; The electric vector of light; Types of Polarized Light; Birefringence; Polarizers

Module — 3: Statistical Mechanics and Thermodynamics 7 Lectures

Principles of Statistical Mechanics (Distribution of particles in thermal equilibrium); Laws of Thermodynamics (Carnot Cycle, Entropy, Clausius-Clapeyron Equation); Information Entropy

Module — 4: Quantum Physics **7 Lectures**

Laws of combining probability amplitudes; The Hamiltonian matrix & Schrödinger equation; Two-state systems: Pauli spin matrices & Photon polarization states; Single Qubit Logic Gates

Module — 5: Properties of Solids **7 Lectures**

Band Theory; Electrical (conductivity, resistivity), Magnetic (dia-para-ferro), Optical (absorbance, reflectance, transmittance), Mechanical (hardness, elasticity) properties (of 'bulk' & 'nano' solids)

Text Book:

R. P. Feynman, R. B. Leighton and M. Sands, **'The Feynman Lectures on Physics'**, *Pearson Education* (2006)

Reference Books:

1. J. Walker, D. Halliday, R. Resnick, **'Principles of Physics'**, *Wiley Student Edition* (10th Edition)
2. H. Young and Roger Freedman, **'University Physics'**, Pearson Addison Wesley (12th Edition)

20BS04L Physics Lab

Teaching Scheme	Examination Scheme
Pract: 2 Hrs per week	In-SEM Exam : 25 Marks
Number of Credits : 1	End-SEM Exam : NA

Course Objectives:

The objective of the Physics Lab course is two-fold:
To inculcate experimental skills
To demonstrate the interplay between theoretical & experimental physics

Course Outcomes:

By taking this course, the students will be able to —

CO — 1: Record observations as per the least counts of measuring instruments
CO — 2: Draw conclusions pertaining to the observed behaviour of physical systems
CO — 3: Compare the experimental findings with the corresponding theoretical physics models
CO — 4: Determine errors in experimental findings & Analyze their sources and causes.

List of Experiments:

Physical Optics Experiments (Michelson Interferometer, Diffraction Grating, Polarization)

Electromagnetism & Heat Experiments (Faraday's Law, Dia-Para-Ferromagnetism, Specific Heat)

Modern Physics Experiments (Planck's Constant, Hall Effect, Zeeman Effect)

20ES01 Basic Electrical and Electronics Engineering

Teaching Scheme:
Lectures: 3 Hrs./Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:

1. To educate the students about the realization of basic theoretical concepts & laws in electrical engineering in real physical world.
2. To make students familiar with three phase supply.
3. To make students familiar with single phase transformers.
4. To understand the construction and applications of diode and BJT
5. To understand basics of combinational logic, Boolean algebra and flip -flops.

Course Outcomes:

After completion of course, students will be able to

1. Analyze and calculate parameters of DC circuits
2. Analyze and calculate parameters of AC circuits
3. Calculate parameters of single phase transformer.
4. Explain working principle, characteristics and simple applications of semiconductor diodes and transistors
5. Build simple combinational and sequential logic circuits.

Unit – I: DC Networks
(06)

Kirchhoff's laws, Mesh and Nodal Analysis, Thevenin and Superposition Theorems, maximum power transfer theorem, Network Simplifications using star-delta / delta-star transformations.

Unit – II: AC Circuits
(06)

Series and parallel RL, RC and RLC circuits , concept of Impedance and admittance, power triangle and power factor. Resonance in series and parallel RLC circuit, Three phase voltage generation and waveform, star and delta balanced systems. Relationship between phase and line quantities, phasor diagram, power in a three phase circuit.

Unit – III: Electromagnetism and Single Phase Transformers
(05)

Magnetic materials and B-H curve, self and mutual inductance,1 Φ transformer: concept, types, working, ideal transformer, practical transformer, equivalent circuit, phasor diagram, efficiency and regulation calculations.

Unit – IV: Diodes and rectifiers
(06)

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Construction and characteristic of p-n junction diode, LED, photodiode, Half wave, full wave and bridge rectifiers, need of capacitor filter, rectifier operation with capacitor filter, Zener diode as a voltage regulator, block diagram of Regulated power supply

Unit – V: Junction Transistor Amplifiers
(06)
Bipolar junction transistor, Construction of BJT, Types of biasing:-fixed bias and self bias circuit, BJT characteristics for-CE,CB,CC configurations, relationship between α and β, load line for a transistor, application of transistor as a switch and amplifier.

Unit – VI: Digital Electronics
(06)
Basic gates, implementation of basic gates using universal gates, Boolean algebra, standard representation of logic functions (SOP and POS forms), Introduction of Combinational logic circuits like multiplexer ,demultiplexer, half adder and full adder, Introduction of Sequential logic circuits like flip- flops (SR, D), counters and shift registers.

Text Books:

1. Hughes, 'Electrical and Electronic Technology', Pearson education, (10th edition), (2008)

Reference Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', McGraw-Hill, (3rd edition), (2010)
2. A.E.Fitzgerald, A.Grabiel,'Basic Electrical engineering',McGraw-Hill, (5th edition), (2009)
3. Floyd, 'Electronic Devices and Circuits', pearson education, (7th edition),(2008)
4. AP Malvino & Donald Leach,'Digital Principles and Applications', McGraw Hill Education,(6 th edition), (2009)

20ES01L Basic Electrical and Electronics Engineering Lab

Teaching Scheme:
Practical: 2 Hrs./Week
Credits: 1

Examination Scheme:
In Sem : 25 marks

Course Outcomes:

After completion of course, students will be able to

1. Perform basic domestic wiring
2. Apply circuit laws to find the parameters of given electrical network
3. Build a basic regulated DC power supply
4. Obtain frequency response of CE amplifier
5. Build basic digital circuits

List of experiments:

0. Introduction of different electrical and electronics components and instruments.
1. To perform wiring to control lamps using one way and two-way switches.
2. To verify Thevenin's theorem & superposition theorem.
3. To determine phase angle of L-C-R series circuit.
4. To perform load test on single phase transformer to determine regulation and efficiency.
5. To determine output voltage and ripple voltage of half wave, full wave rectifier with center tap transformer and bridge rectifier with and without filter.
6. Assemble and build simple DC regulated power supply.
7. To determine frequency response of CE amplifier.
8. Assemble and build half adder & full adder circuits…

20ES02 Fundamentals of Programming Language-1

Teaching Scheme:
Lecture: 1 Hr/week

Examination Scheme:
In-Sem: 25 Marks
Credits: 1

Course Objectives:

To facilitate the learners:

1. To learn the fundamentals of building blocks of computer system.
2. To develop problem solving ability by developing an algorithm, flowchart for given problem.
3. To implement the logic / solution for given problem using C programming language.
4. To understand the decision and iteration interpretation in a programming language.

Course Outcomes:

By taking this course, the learner will be able to:

1. Build algorithms and flowcharts for the given problem statement.
2. Develop a program in C language using appropriate control structure for the contructed algorithm.
3. Make use of variables, data types, operators, expressions, strings and array to program design and implementation.
4. Design and implement modular solution to given problem using functions.

Unit 1: Introduction **(2)**

Introduction to components of a Computer System, types of programming languages.
Introduction to Algorithm: As flow chart, pseudo code, as a program.

Unit 2: Fundamentals of Procedural Programming Language **(1)**

Keywords, Identifiers, Constants and Variables, concept of memory, Structuring procedural program using exemplary language such as C.

Unit 3: Data Types and operators **(2)**

Data types, Typecasting, variable scope, Operators, Basic Input and Output Operations, Expressions and Precedence of Operators.
Illustration using real life examples and use cases.

Unit 4: Control Structures **(2)**

Selection (if-else ladder), Iteration (for loop, while loop).
Illustration using real life examples and use cases.

Unit 5: Arrays and String (2)

Introduction to linear structure (Arrays) and Strings,String functions
Illustration using real life examples and use cases.

Unit 6: Functions (2)

Use of function for modularization, Parameter passing.
Illustration using real life examples and use cases.

Text Books:-

1) Kernighan and Ritchie, " The C programming language" (2nd edition)., Prentice Hall of India, 1988.
2) G. Dromey, "How to Solve it by Computer", Prentice-Hall Inc., Upper Saddle River, NJ, 1982.
3) Yashwant Kanetkar, "Let's C", Allied Publishers, 1998.

Reference books:-

1) Reema Thareja, "Introduction to C programming", Oxford University Press (2^{nd} edition), 2015.
2) Alan R. Feuer, "The C Puzzle book", Pearson, 1999

20ES02L Fundamentals of Programming Language Lab-1

Teaching Scheme:
Practical: 2 Hr/week

Examination Scheme:
In-Sem: 25 Marks
Credits:1

Course Objectives:

To facilitate the learners:
1. To learn the fundamentals of C programming for logic building.
2. To implement solution of given problem using appropriate data type, operators of C language.
3. To understand the decision and iteration interpretation in a programming language.
4. To implement the logic using arrays, strings, functions and structures of C programming language.

Course Outcomes:

By taking this course, the learner will be able to:
1. Apply logic development skills to solve simple real life problems.
2. Implement, test and execute developed logic or algorithm to C program using appropriate data type, operators.
3. Implement the given problem using appropriate control structures available in C language.
4. Identify different functions for a problem to construct a modular solution.

Following example list of problems are grouped into A, B and C, with increasing level of difficulty and understanding. Group A problem statements addresses the concepts of constant, variable, data type, operator and expressions. Group B problem statements addresses the concept of control structures and Group C includes problem which can be solved using functions and string concepts along with the concept covered in Group A and Group B.

Assignments can be framed and expanded in such a way that it explores concepts, language constructs, logic of solution and simple application. Students will be encouraged to solve open problems in different domains. Course tutor will set up assignments to challenge students through code debugging, code improvisation and code transformation. Course tutor will appropriately adopt assignments on similar lines as the examples shown here.

Instructors can conduct a total 10 assignments . Four assignments from Group A, four assignments from Group C and two assignments from Group C.

Example List of Assignments

(Minimum 10 assignments to be implemented, covering maximum Four from each Group. Assignment number 9,10,11 from Group C can be considered as extra assignments. Students can explore more on C constructs to implement these assignments.) :-

Group A

Group A problem statements addresses the concepts of constant, variable, data type, operator and expressions.

1) Write C programs for basic problems Engineering Mathematics and Physics like area calculation, sin wave calculation, speed calculation, determine type of trainagle, verify pythogarous theorem etc.
2) Write C program to convert feet to inches, convert inches to centimeters, and convert centimeters to meters. Write a program that prompts a user for a measurement in feet and converts and outputs this value in meters. Facts to use: 1 ft = 12 inches, 1 inch = 2.54 cm, 100 cm = 1 meter.
3) Write a C program to swap 2 numbers.
4) Write C program to convert Kilograms to grams, convert grams to milligrams and vice a versa.
5) Write C program to convert Dollar to Rupees, convert Euro to Rupees, and vice a versa.
6) Write C program for temperature conversion Degree to Fahrenheit and vice a versa.
7) Write a C program to convert specified days into years, weeks and days.
8) Write a C program that accepts three integers and find the maximum of three.

Group B

Group B problem statements addresses the concept of control structures such as for loop, while loop.

1) Write C program to calculate Least common multiple (LCM) and Greatest Common Divisor (GCD) of given number.
2) Write C program to check whether the given number is prime or not.
3) Write C program to print a given pattern.
4) Write a C program to obtain the first 25 numbers of a Fibonacci sequence. In a Fibonacci sequence the sum of two successive terms gives the third term. Following are the first few terms of the Fibonacci sequence: 1 1 2 3 5 8 13 21 34 55 89...
5) Write C program for simple interest and compound interest calculation.

Group C

Group C includes problem which can be solved using functions and string concepts along with the concept covered in Group A and Group B.

1) Write a C program to swap 2 integers using user defined functions (call by value, call by reference).
2) Write a program in C to compute the factorial of the given positive integer using function.
3) Write a menu driven program to perform following operations using Array of integers like (accept, display, sum of all numbers, search a number, maximum and minimum of number).
4) Write a menu driven program to perform string operations.
5) Write a program in C to compute addition / subtraction / multiplication of two matrices.
6) Write a C program to perform employee operations such as accept, display, search by name, search by number, update a record. Explore the possibility of modularity for implementation.
7) Write a C program to perform bank account related operations such as accept, display, withdraw and deposit money, check balance.
8) A string is provided from the user. Calculate the total number of characters in the string and the total number of vowels in the string with the number of occurrence in the string.
9) For a class an examination is conducted and the results for the students of all the 5 subjects are recorded. Write C program to display the record of students. On the basis of the record compute:
   i. The average score of class
   ii. Highest score and lowest score of class
   iii. Marks scored by most of the students
   iv. List of students who were absent for the test
10) Write a menu-based modular program in C to perform following operations for complex numbers:
   i. reading a complex number
   ii. writing a complex number
   iii. addition of two complex numbers
   iv. subtraction of two complex numbers
   v. multiplication of two complex numbers
11) Two friends issued 5 books each from the library, Write a program in C to compute set operations
   i. List of all books with them
   ii. List common titles with them
   iii. List of books with friend1 but not with friend 2

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20ES03 Sustainable Engineering

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme:
In-Semester: **50** Marks
End-Semester: **50** Marks
Credits: 4

Course Objectives:

1. To understand interdisciplinary approach towards sustainable development.
2. To acquire knowledge, skills, values & attitudes that empowers to contribute to sustainable development.
3. Understand the relevance and importance of natural resources & protection of environment for sustainability.
4. To understand the role of engineering & technology within sustainable development.

Course Outcomes:

- A student should be able to:

1. Identify the need of sustainable development
2. Improve fundamental knowledge of interrelationship between the built & natural environment
3. Suggest materials and technologies to improve energy efficiency of building
4. Apply the knowledge in the area of sustainability for research and education
5. Apply concept of sustainability in a broader prospect
6. Analyse and explain local, national and global sustainability using multidisciplinary approach

Unit – I: Introduction to sustainable engineering **(05)**

- Need and concept of sustainability
- Principles of sustainability
- Pillars of sustainable development
- Multidisciplinary approach for sustainable development
- Case study on Innovative technologies

Unit – II: Environmental sustainability **(06)**

- Concept of natural and built environment
- Concept of integrated built environment
- Environmental global issue - Urban sprawl
- Role of individual to protect environment

Unit – III: Green materials and green building **(06)**

- Basic concept of Green buildings & its co-relation with sustainability

- Material selection for sustainable design of green building
- Concept of circular economy
- Concept of IGBC
- Green building certification
- Methods for increasing energy efficiency of buildings
-

Unit – IV: Sustainable use of water and energy resources **(08)**

- Water resources – use and conservation of water ,sustainable use of drinking water – waste water management- case study

- Energy resources – Renewable and non-renewable sources of energy – conservation of non-renewable energy sources – case study, Definition & case study on LCA.

Unit – V: Smart city **(05)**

- Concept and features of smart city
- Strategies
- Concept of smart village
- Two case studies

Unit – VI: Role of community and society in sustainable development **(06)**

- Role of government
- Global environmental agreements and protocols (Montreal& Kyoto protocol), Copenhagen summit
- Role of citizen
- Contribution of NGOs - social networking
- Case study

Tutorials list-

- Check your Energy IQ (Questionnaire)
- Analysis of Electricity Bill
- Poster making on Environmental awareness
- Presentation on conservation of energy
- Energy Efficient House- Survey (Questionnaire and discussion)
- Network Diagram for Water Conservation for Domestic(Indoor and Outdoor) Purpose
- Activity based on Reuse of materials from solid waste and E-waste.
- Fuel saving drive – Quiz
- Study of Old and new techniques for efficient use of Energy
- Study of Different Government and NGOs Schemes for Environmental Protection

Text Books:

R.L.Rag, Lekshmi dinachandran Ramesh - **Introduction to Sustainable engineering**

Reference Books:

Bhavik R. Bakshi - **Sustainable engineering (principles and practise)** -*Ohio state university*

Allen D.T and shonnard D. R- **Sustainability engineering concept design and case studies**

Mokia schoiz- **Sustainable Water treatment engineering solution for variable climate**

DT Allen, DR Shonnard- **Green engineering: environmentally conscious design of chemical processes**

R.Rajagopalan – **Environmental Studies from Crisis to Cure** – *Oxford Publication, Third edition,2016.*

Ajith Sankar R.N.- **Environmental Management** - *Oxford Publication, First edition,2015.*

Shah, Kale, Patki – **Building planning and Built environment** -*Tata McGraw Hill*

Books and website

- Intro reads: Desire for Development, Plan B
- Down to Earth - Magazine (hard copy and softcopies available)
- https://www.unsdsn.org/ - For the World
- www.cseindia.org - For India
- indiaenvironmentalportal.org.in
- TERI - www.teriin.org
- cwmi.css.cornell.edu
- rodaleinstitute.org

20ES04 Engineering Graphics

Teaching Scheme	**Examination Scheme**
Theory: 2 Hrs/week	In semester: 50
Tutorial: 1 Hr/week	End semester: 50
Credits: 3	

Course Objectives:

1. To develop the visualization and interpretation skills for the physical objects.
2. To provide the basic knowledge and develop the skills for creating 2 D drawings.
3. To provide the basic knowledge and develop the skills for creating Isometric views.
4. To familiarize about the development of solids.
5. To familiarize the construction and applications of Engineering Curves.

Course Outcomes:

After completing the course students will be able to draw

1. Orthographic and sectional orthographic projections of an object
2. Isometric views of the given object
3. Development of surfaces of the given object
4. Engineering curves by applying the given method

Unit – 1 Introduction	Layout and sizes of drawing sheets, drawing instruments, types of lines used in drawing practice, dimensioning systems, representation of tolerances, standard codes by B.I.S (SP-46). **(Not for Examination)**	**(01)**
Unit – 2 Orthographic Projection	Theory of projections, methods of obtaining orthographic views, sectional orthographic projections, Missing views.	**(08)**
Unit – 3 Isometric Views	Isometric axes, Isometric scale, isometric projections and views, construction of isometric view from given orthographic views.	**(07)**
Unit – 4 Development of Solids	Parallel line development, radial line development, methods to transfer points for development of prisms, pyramids, cylinder and cone.	**(04)**
Unit – 5 Engineering Curves	Construction of ellipse, parabola, hyperbola, involute, cycloid, Archimedean spiral, helix on cone and cylinder.	**(04)**

Text Books:

1. N. D. Bhatt and V. M. Panchal,**'Engineering drawing, plane and solid geometry'**, *Charotor Publication House.*
2. 2) R. K. Dhawan,**'A text book of Engineering Drawing'**, *Pearson Education Inc.*
3. 3) P.S. Gill, **'Engineering Graphics'**, *Kataria and sons Publications.*
4. 4) M. L. Dabhade, **'Engineering Graphics'**, *Vision Publications.*

Reference Books:

1. Warren J. Luzzader, **'Fundamentals of Engineering Drawing'**, *Prentice Hall of India, New Delhi.*
2. Fredderock E. Giesecke, Alva Mitchell, **'Principles of Engineering Graphics'**,*Maxwell*
3. Dhananjay A. Jolhe, **'Engineering Drawing'**, *Tata McGrawHill Publishing Co. Ltd.*

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20ES04L Engineering Graphics Lab

Teaching Scheme

Practical: 2 Hrs/week

Credits: 1

Examination Scheme

In Semester: 25 marks

Course Objectives:

To familiarize student about

1. Advantages of using software for Engineering drawing
2. 2-D drafting using a software
3. 3-D modeling using a software
4. 3-D printing technology

Course Outcomes:

After completing the course using a software package students will be able to

1. Draw orthographic projections of a given component
2. Draw Isometric projections of a given component
3. Draw development of solids
4. Draw free hand sketches of the machine elements

Part I **Introduction to 2-D Drafting using a drafting software** **(18)**

- Orthographic Projections
- Isometric Projections
- Development of surfaces of solids
- Free hand sketching of standard machine elements

Part II **Demonstration of 3-D Modeling and 3-D Printing** **(06)**

Creating a 3-D model of a simple component using a solid modeling software and manufacture using a rapid prototyping technique.

Text Books:

5. N. D. Bhatt and V. M. Panchal,'*Engineering drawing, plane and solid geometry*', Charotor Publication House.
6. M.L.Dabhade, **'Engineering Graphics'**, *Vision Publications.*
7. Bethune, J.D., "*Engineering Graphics with AutoCAD 2013*", PHI Learning Private Limited, Delhi, 2013

Engineering Graphics Tutorial

Teaching Scheme

Tutorial: 1 Hr/week

Credits: 1

Examination Scheme

In semester: -

End semester: -

Tutorial No	Details
1	Introduction to layout and sizes of drawing sheets, drawing instruments, types of lines used in drawing practice, dimensioning systems
2	Construction of ellipse, parabola, hyperbola by directrix focus method
3	Construction of ellipse, parabola, hyperbola by rectangle method
4	Construction of involute, cycloid, Archimedean
5	Construction of Helix on cone and cylinder, spiral
6	Draw on orthographic projection
7	Draw sectional orthographic projection
8	Draw missing views
9	Draw of isometric view from given orthographic views
10	Draw development of lateral surfaces of prisms, pyramids,
11	Draw development of lateral surfaces cylinder and cone

20ES05 Fundamentals of Programming Language-2

Teaching Scheme:
Lecture: 3 Hr/week

Examination Scheme:
In-Sem: 50 Marks
End-Sem: 50 Marks
Credits: 3

Course Objectives:

To facilitate the learners:

1)To understand and apply object-oriented principles for application development.
2)To develop programming applications using Java.
3)To make use of class, object, constructor.
4)Learn programming construct of Java.

Course Outcome:

By taking this course, the learner will be able to:

1) Demonstrate and Make use of object-oriented principles for effective programming.
2) Construct readable and maintainable code using polymorphism.
3) Apply object oriented concepts of class, object creation and constructor for program development.
4) Apply principles of code-refactoring and efficient code reuse for problem solving.

Unit-I : Introduction to Object Oriented Programming Paradigm **(5)**

Role and need of programming languages, characteristics of a good programming language, introduction to various programming paradigms. Need of object-oriented paradigm, basic concepts of object oriented programming (OOP), benefits of OOP. General characteristics for OOP, Object oriented concepts: Class, Object, abstraction, encapsulation, polymorphism, and inheritance.
Illustration through real life examples and use cases

Unit-II : Introduction to Java Programming Language **(6)**

History of Java, Features of Java, Java and Internet, Java virtual machine, First java Program, Command line arguments, Java Programming elements: Data types, Control Structures, Encapsulation, Abstraction and Polymorphism, Class, object, constructor
Illustration through real life examples and use cases

Unit-III : Polymorphism **(5)**

This keyword, static method, function overloading, argument passing, constructor overloading. String and Array's in Java, Java Collection Framework – Arraylist, HashSet
Illustration through real life examples and use cases

Unit-IV: Inheritance **(6)**

Types of inheritance, base class and derived class, access specifiers, method overriding.
Illustration through real life examples and use cases

Unit-V: Abstract Class, Interfaces and Packages **(6)**

Abstract class, interfaces, run time polymorphism. Creating and importing packages.
Illustration through real life examples and use cases

Unit-VI: Exception Handling in Java **(5)**

Errors and Exceptions, Types of exceptions, try, catch, throw, throws and finally keywords, Build-in exceptions, creating and using custom exceptions.
Illustration through real life examples and use cases

Text Books:

1. Herbert Schilt, "JAVA Complete Reference", Tata McGraw Hill, (9th Edition), (2014)
2. Eckel B., "Thinking in Java", Pearson Education, (3rd Edition)

Reference Books:

1. Kathy Sierra & Bert Bates, "Head First Java", Oreilly publication,(2nd Edition) (2009)
2. Barry Burd "Beginning Programming with Java for Dummies", Oreilly publication, (5th Edition) (2017)
3. Paul Deital and Harvey Deital,"Java How to program", Prentice Hall Publication,(9th Edition) (2011)

20ES05L Fundamentals of Programming Language Lab-2

Teaching Scheme:
Practical: 2 Hr/week

Examination Scheme:
In-Sem: 25 Marks
Credits: 1

Course Objectives:
To facilitate the learners:

1) To explore the principles of object oriented programming
2) To apply object oriented programming concept for developing applications using Java
3) To make use of class, object and constructor for coding basic object oriented program
4) To handle built-in and user defined exceptions

Course Outcome:
By taking this course, the learner will be able to:

1) Develop basic object oriented program using class, object and constructor
2) Develop readable and reusable code using inheritance and polymorphism
3) Make use of exceptions using inbuilt classes and user defined exceptions
4) Develop application using object oriented programming language Java to solve given problem

A large part of ESFL205 lab would be for understanding the basic concepts of object oriented programming and implementation of some real world simple applications. Assignment statements are in brief and should be implemented in JAVA programming language. Faculty members are encouraged to expand problem statements with variations. Assignments can be framed and expanded in such a way that it explores concepts, language constructs, logic of solution and simple application. Students will be encouraged to solve open problems in different domains. Faculty will appropriately adopt assignments on similar lines as the examples shown here.

Example List of assignments:-

Group A: Assignment to write program in OO language to understand concept of data abstraction and encapsulation

1. Write a MyDate class which has attributes as day, month and year. Create five objects of MyDate and display them.
2. Design a user defined abstract data type 'Complex' in Java. Write a program to perform arithmetic operations of two complex numbers.
   A complex number has a real part and an imaginary part.
   a) Given the values of real part and imaginary part of a complex number, the magnitude of the complex number can be calculated as square root of the sum of squares of real part and the imaginary part.

b) The argument of the complex number can be calculated as tan inverse of ratio of imaginary part(numerator) and real part(denominator)

c) The complex number can be added to another complex number and the answer of the addition is a complex number. When one adds two complex numbers, the real parts of each of the complex numbers is added which becomes a real part of the answer and imaginary part of each complex number is added together which becomes imaginary part of the answer. Both these results are real and imaginary parts for a complex number which is the answer of the addition complex conjugate of the complex number can be calculated by negating the imaginary part of the complex number

d) The complex number can be subtracted from another complex number and the answer of the subtraction is a complex number.

e) When one subtracts a complex number from the other, the real part one complex number is subtracted from the other and the result becomes a real part of the answer and imaginary part of one complex number is number is subtracted from the other and the result of subtraction becomes imaginary part of the answer. Both these results are real and imaginary parts for a complex number which is the answer of the subtraction.

3. Create a student result database in Java. Calculate the grades of students. Decide criteria for best student and short-list students who satisfy the criteria.
   a) A student has a rollNo, name, marks in five courses and a grade. A student list has many students. If a student has grade equal or beyond 8, he is considered as a top band student.
   b) Create at least ten students. From these, find all such students which satisfy the criteria of top band student. Create a list of such students and display the students in the list.

4. A circle has a radius. Its area can be calculated. The area is a double number. Its perimeter can be calculated as $2\pi r$. The perimeter is a double number. Given two circles one can find out which is large and which is small.
   Create two circles c1 and c2 with radius as 10 and 7 respectively. Calculate the area and perimeter of each. Compare two circles with each other and display which is large and which is small.
5. Write a JAVA program to perform String operations using String/StringBuffer class
   a) Write a program that reads a word and then prints the first character, the last character, and the characters in the middle. For example, if the input is Cummins ,the program prints C s ummin.
   b) Write a program that reads a name (such as Ranbeer Rishi Kapoor) and then prints a monogram consisting of the initial letters of the first, middle, and lastname (such as RRK).

Group B:Assignment to write program in OO language to understand concept of class inheritance and polymorphism.

1. Implement Java program to calculate area and perimeter of various shapes-circle, triangle and rectangle.
2. A company has many employees. An employee has employee Id, basic salary, house rent allowance, dearness allowance, profession tax and total salary. An employee has an address. The address has apartment number, apartment name, road and PIN code.
   The total salary of an employee is the summation of basic salary, house rent allowance which is 20 percent of basic salary, dearness allowance which is 45 percent of basic salary. The take home salary is calculated after deducting profession tax from which is 7 percent of basic salary from the total salary.
   When an employee is appointed, he is assigned with an employee Id and basic salary. One can ask for total salary of the employee and take-home salary of the employee.
   Identify a class/classes from the above statement, identify the attributes, the data types, the behavior. Test your program for ten employees
   Display all the details of the employees as per id and as per pin code.
   Display takes home salary for all the employees; display the tax to be deducted across all employees.
3. Reading material has title and price. A book is a reading material. It has ISBN number. A magazine is a reading material, it has month of issue. A CD is a reading material, it has duration in minutes. Represent the above description as a generalization, specialization tree. Identify the parent class, its attributes, child class and their attributes. Write all of them clearly.
4. A vehicle has engine no and chassis number. It can be locked, unlocked. Every vehicle is movable (interface). It can be started, stopped, turned, accelerated, turned, and decelerated.
   A car is a vehicle. It has steering. An airplane is a vehicle. It has wings. A boat is a vehicle. It has propeller.
5. Create an application like book shop and maintain the inventory of books that are being sold at the shop
6. Find appropriate class hierarchy, polymorphic behavior in applications like banking and implement it.
7. Model the HRD application using the concepts of inheritance, interface, polymorphism

Group C: Assignment to write program in OO language to understand concept of exception handling

1) Write a program to catch various in-built exceptions(try, catch and finally block)
2) Create User defined exception to check the specific conditions for systems like recruitment etc and throw the exception if the criterion does not met in Java.

3) Consider student data consist of fields such as roll number, name, and marks of various subjects. Write a program using inbuilt and user defined exceptions to avoid invalid entry.

20ES05M Engineering Mechanics
(For Mech Engg Students Only)

Teaching Scheme
Lecture: 02 Hrs/week
Tutorials: 01 Hrs/week
Credits: 3

Examination Scheme
In semester: 50 marks
End semester: 50 marks

Course Objectives
1. To familiarize the concept of equilibrium and friction
2. To study and analyze motion of moving particles/bodies.

Course Outcomes: Students will be able to…
1. Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
2. Correlate real life application to specific type of friction and estimate required force to overcome friction.
3. Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the relation
4. Analyze particles in motion using force and acceleration, work-energy and impulse momentum principles

1. **Rigid body static:** Equivalent force system. Equations of equilibrium, free body diagram, Reaction, Static indeterminacy and partial constraints, Two and three force systems. **Structures:** 2D truss, Method of joints, Method of section. Frame, Beam, types of loading and supports, Shear Force and Bending Moment diagram, (6)
2. **Friction:** Dry friction (static and kinematics), wedge friction, disk friction (thrust bearing), belt friction, journal bearings (Axle friction), Wheel friction, Rolling resistance. (3)
3. **Center of Gravity and Moment of Inertia:** First and second moment of area and mass, radius of gyration, parallel axis theorem, product of inertia, rotation of axes and principal M. I., Thin plates, M.I. by direct method (integration), composite bodies. (4)
4. **Kinematics of Particles:** Rectilinear motion, curvilinear motion rectangular, normal tangential, polar, cylindrical, spherical (coordinates), relative and constrained motion, space curvilinear motion. (4)
5. **Dynamics of Particles:** Force, mass and acceleration, work and energy, impulse and momentum, impact. (3)
6. **Kinetics of Rigid Bodies:** Translation, fixed axis rotation, general planner motion, work-energy, power, potential energy, impulse-momentum and associated conservation principles, Euler equations of motion and its application. (4)

TEXT BOOKS

1. Ferdinand P. Beer, E. Russell Johnston Jr., David Mazurek, Philip J Cornwell, Vector Mechanics for Engineers: Statics and Dynamics , McGraw - Hill, New Delhi, Tenth Edition 2013
2. Palanichamy, M. S., and Nagan, S., Engineering Mechanics (Statics and Dynamics), Tata McGraw Hill, New Delhi Eighth reprint 2011(Third edition)

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REFERENCE BOOKS

1. Timoshenko, and Young, Engineering Mechanics, Tata Mc-Graw Hill Book Company, Edition 4, New Delhi, 1988

2. Mclean, and Nelson, Theory and problems of Engineering Mechanics (Statics and Dynamics), 3rd Edition Schaum Series, 1980

3. Rajasekaran, S., & Sankarasubramanian, G., Engineering Mechanics, Vikas Publishing House Pvt Ltd, 2011 4. Shames, I.H., and Krishna Mohana Rao, G.,

4. Engineering Mechanics (Statics and Dynamics), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 2006

5. Dr.R.K.Bansal & Sanjay Bansal, A Text book of Engineering Mechanics, Lakshimi publications, Edition 7, 2011.

20ES05ML Engineering Mechanics Lab

Teaching Scheme
Practical: 02 Hrs/week
Credits: 1

Examination Scheme
In-semester: 25 marks

Course Objective: To demonstrate students the basic principles of Engineering Mechanics, namely, Engineering Statics and Engineering Dynamics. The emphasis will be on psychomotor skills.

Course Outcome: At the end of the course, the student will be able to:

CO1: Verify law of Force Polygon and law of Moments.
CO2: Determine mechanical advantage, Velocity ratio and efficiency of a screw jack.
CO3: Evaluate co-efficient of friction between two different materials.
CO4: Determine mechanical advantage, velocity ratio and Mechanical efficiency.

1. To verify the law of Force Polygon.
2. To verify the law of Moments using Parallel force apparatus.(simply supported type).
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminium) on an inclined plane.
4. To find the forces in the members of jib Crane.
5. To determine the mechanical advantage, velocity ratio and Mechanical efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the wheel and axle.
7. Verification of force transmitted by members of given truss.
8. To verify the law of moments using Bell-crank lever.
9. To find CG and moment of Inertia of an irregular body experimentally and verify using Computation method.

20ES06 Geo-Informatics

Teaching Scheme:
Lectures: 3 Hrs/Week
Practical: 2 Hr/Week

Examination Scheme:
In-Semester: **50** Marks
End-Semester: **50** Marks
Credits: 4

Course Objectives:

1. To introduce the science and technologies involved in Remote sensing.
2. To understand the application of GIS in various fields
3. To explain the earth and mapping principles.
4. To learn basics about the Geodata & GIS software.

Course Outcomes:

A student should be able to:

1. Demonstrate fundamentals of remote sensing
2. Interpret data from satellite images and their characteristics.
3. Compare and understand an image visually and digitally with digital image processing techniques.
4. Explain the concepts and fundamentals of GIS.
5. Differentiate between types of GPS and their working principles
6. Apply knowledge of remote sensing and GIS in different engineering applications.

Unit – I: Principles of remote sensing **(05)**

- Concept of Remote Sensing
- Working Principle
- Types of remote sensing
- Platforms of remote sensing
- Output of remote sensing – photography, satellite imaginary and visual interpretation data

Unit – II: Data interpretation method in remote sensing **(05)**

- Types of data
- Visual interpretation of images-Natural and false colour composites,
- Image resolution
- Limitations
- Applications

Unit – III: Photogrammetry & Cartography **(06)**

A) Fundamentals of aerial photography, satellite images, virtual images, Image processing, Digitalization of maps.

B). Cartography

- Conventional Maps, Definition, Map Basics Elements/components of map,

Map Scale, Large & Small Scale maps, Thematic maps , Coordinate system
- Polar & Cartesian (Latitude-Longitude & x, y coordinates)

Unit – IV: Geographical information system (GIS) & Database management for geoinformatics **(08)**

A). GIS
- Concept & definition of GIS (based on components, based on functions)
- GIS vs. Conventional Mapping,
- Components of GIS,
- Working Principle of GIS,
- Strengths of GIS,
- Geoinformatics Vs. GIS

B). Database management for geoinformatics
- GIS Data and Data Models
-Concept of Query
- Concept of Spatial Analysis.

Unit – V: Global positioning system (GPS) **(05)**

- History of GPS
- Types of GPS
- Working principle
- Applications of GPS
- case study

Unit – VI: - Application of geoinformatics **(07)**

Case studies to be used for demonstration-
-Navigational services – available on phones (travel direction from A to B)
-Vehicle tracking system / Fleet management – Cabs, City buses, Trains, Aircrafts
-City Planning (urban sprawl, master planning)
-Solid waste management (identifying location for waste disposal site, route optimization of waste collection, online/offline monitoring of waste collection)
-Identifying suitable location for business outlet (Pizza hut, Teco bell, General Motors)
-GIS for location based services (courier & other home delivery services) – Fedex, DHL
-Telecom sector uses GIS (planning of OFC network, identifying suitable location for mobile towers, marketing, operations)
-Disaster Management using GIS (modelling & simulation tools – through videos)

Text Books:

1.LO. C.P., and Albert K.W.Yeung- **Concepts and Techniques of Geographic**

Information Systems, *Prentice-Hall of India, New Delhi, 2006.*
2.Ian Heywood, Sarah Cornelius and Steve Carver **-An Introduction to Geographical Information Systems-** *(4th Edition) by 2012*
3. A.M. Chandra, S.K. Ghosh,- "**Remote Sensing and Geographical Information System**", *1 st Edition, Narosa Publishing house, 2007.*

Reference Books:

1. Peter A. Burrough and Rachael A. Mc. Donnell- **Principles of Geographical Information** System, *Oxford University Press Inc., New York, 2004.*
2. Ian Heywood, Sarah Cornelivs and Steve Carver, **An Introduction to Geographical Information System**, *Pearson Education Pvt .Ltd., New Delhi, 2007.*
3. Arthur H. Robinson et al. **Elements of Cartography**, *V Edition, John Wiley & Sons, New Delhi, 2002.*
4. Misra, R.P.and Ramesh, A**, Fundamentals of Cartography concept-***Publishing Company, New Delhi, 2002.*
5. Lillesand M. Thomas and Ralph W.Kiefer **- Remote Sensing and Image Interpretation**

20ES06L Geo-Informatics Lab

Teaching Scheme:
Practical : 2 Hr/Week

Examination Scheme:
Practical/Oral: 25 Marks

Credits: 1

Course Objectives:

1. To learn basics about the Geodata & GIS software.
2. To introduce students basics of spatial data and its creation.

Course Outcomes:

A student should be able to:

1. Demonstrate the process of data acquisition of satellite images and their characteristics.
2. Apply basic data visualization concepts such as colour theory, symbolization.
3. Explain the components of GIS.
4. Apply knowledge of remote sensing and GIS in various engineering applications.

A)Remote Sensing Lab

1. Observation of feature details seen in images of different resolutions, 3D visualization of aerial photograph using Stereoscope.
2. Visual Interpretation of multispectral and Panchromatic image

B) GIS Lab

3. Exploring Google Earth
   - Locating a place
   -Layers
   -Display Controls
   -Changing coordinate system
   -Adding place marks(Ground trothing)
   -Saving KMZ/ KML files
4. Open source software of GIS
   -Understanding QGIS interface
   -Different types of file formats
5. Working with Data
   -Adding Vector data/ Raster Data
   -Display Controls
6. Point, Line, Polygon feature,
   -Feature selection/deselection
7. Layers, Properties of layers, Feature Symbology
8. Querying data -Aspatial and Spatial Query

9. Digitization of map, Creating layers

C)**GPS Lab-** Liner data collection using GPS

References- Learning QGIS packt publishing by Anita Gaser

20ES07 Technical Skill Development Laboratory

Teaching Scheme:
Practical: 2 Hrs/Week

Examination Scheme:
In-Semester:25 Marks

Course Objective: Student will able to learn

1. To identify tools, work material and measuring instruments useful for assembly-dissemble of products and different machining operations
2. To handle tools and instruments and use them to prepare joints of specific shape and size.
3. To install software and Operating system on computers

Course Outcome: Student will able

1. To select suitable tools for assembly- dissemble a product.
2. To produce joints using materials of specific shape and size by a suitable set of operations and check the accuracy of shape and dimensions using measuring instruments
3. To install operating systems and software on computers

Content:

Sr. No	Description	Hrs
1	• Use of measuring devices and instruments : Vernier Calliper, Micrometer, Digital Multi-meter, Tachometer, Lux meter etc.	2
2	• Assembly -disassembly of products: Electric Iorn, Water Purifier, Fan, Mixer Grinder etc.	4
3	• Use of joining methods: Soldering and Welding.	4
4	• Study and Hands on different day to day machining operations: such as drilling, tapping PVC pipe fitting, hacksaw cutting and filing.	2
5	• Use of Machine Tool (Lathe machine)	6
6	• Basic troubleshooting computer System in Hardware and Software. • Installing and Uninstalling software's (OS + APPS) • Computer system security aspects (Physical and logical)	6

****NOTE: Practical No. 5 is For Mechanical Engineering Branch and Practical No. 6 is for COMP/IT/E&TC/INSTRU Branch**

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Text Books:

1. Elements of Mechanical Engineering - Hajra Choudhury & others, Media Promoters 2010.

2. The Elements of Workshop Technology - Vol I & II, S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy, 11th edition 2001 others, Media Promoters and Publishers, Mumbai.

Reference:

1. Workshop manual prepared by Department of Mechanical Engineering.

20AC01 Value Education

Teaching Scheme:
Lectures: 1 Hr /Week
Tutorial: Nil

Examination Scheme:
In-Semester: **Nil**
End-Semester: **Nil**
Credits: Nil

Course Objectives:

1. To make understand importance of values in human behavior.
2. To understand adjustments required in one self and others to uphold values in society.
3. To understand importance of values in Family Life
4. To understand ethics required by professionals in work place.

Course Outcomes:

1. Students will appreciate importance of values in all walks of life.
2. To develop women professional with strong ethics and above all be a good human being.
3. To help students to develop their own value system and action plan based on it.
4. To understand the impact of the Moral role of students in nation building and being a responsible citizen.
5. Understand effects of Global issue like Terrorism, Environment, different cultures etc.

Unit – I: Values and Self Development **(03)**

Value Education – Definition - relevance to present day - Concept of Human Values - self introspection - Self-esteem.

Unit – II: Family values **(03)**

Components, structure and responsibilities of family - Neutralization of anger - Adjustability- Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

Unit – III: Ethical values **(03)**

Professional ethics - Mass media ethics- Advertising ethics -Influence of ethics on family life - psychology of children and youth – Leadership qualities - Personality development.

Unit – IV: Social values **(03)**

Faith, service and secularism - Social sense and commitment -Students and Politics -Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressed mechanisms

Unit – V: Effect of international affairs on values of life/ Issue of Globalization **(03)**

Modern warfare -Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Text Books:

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1. Chakraborty, S.K., **'Values and Ethics for Organizations Theory and Practice'**, *Oxford University Press, New Delhi*, (2001)

Reference Books:

1. T. Anchukandam and J. Kuttainimathathil (Ed) **'Grow Free Live Free'**, *Krisitu Jyoti Publications, Bangalore* (1995)

2. Mani Jacob (Ed) **'Resource Book for Value Education'**, *Institute for Value Education, New Delhi* (2002).

3. S. Ignacimuthu, **'Values for Life'** *Better Yourself Books, Mumbai, (1991).*

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