1901MA105	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

MODULE I BOOLEAN ALGEBRA **09 Hours**

Propositions- Logical connectives-Compound propositions-Conditional and bi conditional propositions- Truth tables - Tautologie and Contradictions - Logical and equivalences and implications - De Morgan"s Laws- Normal forms-Principal conjunctive and disjunctive normal forms Rules of inference-Arguments-Validity of arguments - Karnaugh map.

MODULE II ABSTRACT ALGEBRA **09 Hours**

Set Operations - Properties - Power set -Relations - Graph and matrix of a relation - Partial Ordering - Equivalence relations - Group - Ring – Field.

MODULE III COMBINATORICS **09 Hours**

Basics of Counting-Counting arguments- Pigeonhole Principle-Permutations and Combinations- Recursion and recurrence relations-Generating Functions-Mathematical Induction- Inclusion -Exclusion.

MODULE IV CALCULUS **09 Hours**

Limits of functions -Continuity -Derivatives: Derivatives -Differentiability - Rules - Properties - Differentiation of transcendental functions - Higher order derivatives - Implicit differentiation - Integration: Anti-derivatives - Riemann sum -Indefinite and Definite integration - Mean value theorem for definite integral - Fundamental theorem of calculus.

MODULE V MULTIPLE INTEGRALS **09 Hours**

Double integration with constant and variable limits-Region of integration -Change the order of integration - Area as double integral in Cartesian coordinates - Triple integral in Cartesian coordinates

TOTAL: 45 HOURS

REFERENCES:

1. N. Herstein, Topics in Algebra, John Wiley and Sons, 2015
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 2017
3. Gilbert Strang, Introduction to linear algebra, Fifth Edition, Wellesley Cambridge Press, 2017
4. Peter V. O"Neil, Advanced Engineering Mathematics, Seventh Edition, Thomson Learning, 2011

Course outcomes :

Module 1 – Skill development

Module 2 – Skill development

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1901MA106 **PROBABILITY AND STATISTICS**

L	T	P	C
3	0	0	3

MODULE I PROBABILITY AND RANDOM VARIABLE **9 Hours**

Probability: Concepts of experiments, Sample space, event - Combinatorial probability - Conditional probability - Baye's theorem. Random variable: Probability mass function - Probability density function Properties - Mathematical expectation and its properties-Moments and its properties - Moment generating functions.

MODULE II PROBABILITY DISTRIBUTIONS **9 Hours**

Discrete Probability distributions: Binomial distribution -Poisson distribution - Geometric distribution. Continuous Probability distributions: Uniform distribution - Exponential distribution - Normal distribution.

MODULE III TWO DIMENSIONAL RANDOM VARIABLES **9 Hours**

Joint Distribution - Discrete and continuous distributions - Marginal and Conditional Distributions - Correlation- Rank correlation - Linear Regression

MODULE IV INTRODUCTION TO STATISTICS **9 Hours**

Definition of Statistics - Basic Objectives - Collection of Data - Population - Sample - Representative Sample - Classification and Tabulation of Univariate data - Graphical representation - Frequency curves - Central tendency and Dispersion - Applications.

MODULE V TESTING OF HYPOTHESIS **9 Hours**

Sampling - Large sample test: Tests for Single mean- Test for difference between two means. Small sample test: Tests for mean (t test), F- test - Chi-square test for Goodness of fit and Independence of attributes.

TOTAL: 45 HOURS

REFERENCES:

1. S. M. Ross, Introduction of Probability Models, Academic Press, springer Publication, 2000
2. A. Goon, M. Gupta and B. Dasgupta, Fundamentals of Statistics, Vol. I & II, World Press, 2013
3. I. R. Miller, J.E. Freund and R. Johnson, "Probability and Statistics for Engineers". Fourth Edition, PHI, 2011.
4. A. M. Mood, F.A. Graybill and D.C. Boes, "Introduction to the Theory of Statistics", McGraw Hill Education, 2010.

Course outcomes:

Module I: Skill development

Module IV: Skill development

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1901GE102 **PRINCIPLES OF ELECTRICAL ENGINEERING**

L	T	P	C
2	0	2	3

MODULE I INTRODUCTION **7 Hours**

Concept of Potential difference, voltage, current, Fundamental linear passive and active elements to their functional current-voltage relation, Terminology and symbols in order to describe electric networks, Concept of work, power, energy and conversion of energy.

MODULE II DC CIRCUITS **10 Hours**

Current-voltage relations of electric network by mathematical equations to analyse the network (Thevenin's theorem, Norton-s Theorem, Maximum Power Transfer theorem) voltage source and current sources, ideal and practical, Kirchhoff-s laws and applications to network solutions using mesh analysis, Simplifications of networks using series- parallel, Star/Delta transformation. Superposition theorem.

MODULE III AC CIRCUITS **9 Hours**

AC waveform definitions, form factor, peak factor, study of R-L, R-C,RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3 phase Balanced AC Circuits.

MODULE IV ELECTROSTATICS AND ELECTRO-MECHANICS **10 Hours**

Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors, Electricity and Magnetism, magnetic field and faraday's law, self and mutual inductance, Ampere's law, Magnetic circuit, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, KVA rating, efficiency and regulation, Electromechanical energy conversion,

MODULE V MEASUREMENTS AND SENSORS **9 Hours**

Introduction to measuring devices/sensors and transducers related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems and their practical application. Electrical Wiring and Illumination system: Basic layout of distribution system, Types of Wiring System &Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED)

EXPERIMENT 1:	Familiarization of electrical Elements, sources, measuring devices and transducers related to electrical circuits	**4 hours**
EXPERIMENT 2:	Determination of resistance temperature coefficient	**4 hours**
EXPERIMENT 3:	Verification of Network Theorem (Superposition, Thevenin, Norton, Maximum Power Transfer theorem)	**4 hours**
EXPERIMENT 4:	Simulation of R-L-C series circuits for XL>XC , XL< XC	**4 hours**
EXPERIMENT 5:	Simulation of Time response of RC circuit	**5 hours**
EXPERIMENT 6:	Verification of relation in between voltage and current in three phase balanced star and delta connected loads.	**4 hours**
EXPERIMENT 7:	Demonstration of measurement of electrical quantities in DC and AC systems.	**5 hours**

TOTAL: 75 HOURS

REFERENCES:

1. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.
2. Smarjith Ghosh, Fundamentals of Electrical and Electronics Engineering, Prentice Hall (India) Pvt. Ltd., 2010
3. A. Sudhakar, Shyammohan S Palli, Circuits and Networks Analysis and Synthesis, Tata McGraw Hill, 2010
4. Muthusubramanian&Salivahanan, Basic Electrical and Electronics Engineering and Communication Engineering, Seventh Edition, Tata MCGraw Hill Education Private Limited, 2011
5. William H. Hayt, Jr. John A. Buck, Engineering Electromagnetics, McGraw Hill Higher Education, 8th revised Edition, 2011.
6. K. A. Gangadhar, P.M. Ramanathan, Electromagnetic Field Theory, Khanna Publishers, Sixteenth Edition, 2011

Modale III & V – Skill development / Employability

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1901PH103 **FUNDAMENTALS OF PHYSICS**

L	T	P	C
2	0	2	3

MODULE I OSCILLATIONS **9 Hours**

Periodic motion-simple harmonic motion-characteristics of simple harmonic motion-vibration of simple springs mass system. Resonance-definition., damped harmonic oscillator - heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators

MODULE II CLASSICAL OPTICS **9 Hours**

Theory of interference fringes-types of interference- Fresnel-s prism- Newton- rings. Diffraction-Two kinds of diffraction-Difference between interference and diffraction Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence, Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster's law, double refraction.

MODULE III QUANTUM PHYSICS **9 Hours**

Dual nature of matter - development of quantum theory- de-Broglie wavelength - Schrodinger's wave equation: time dependent and time independent wave equations - physical significance of wave function - application: particle in one dimensional box.

MODULE IV CRYSTAL PHYSICS **9 Hours**

Crystalline and amorphous materials - lattice - space lattice point - basis - MODULE cell - crystal systems - Bravais lattices - Miller indices - "d" spacing in cubic lattice - calculation of number of atoms per MODULE cell, atomic radius, coordination number and packing density for SC, BCC, FCC and HCP structures.

MODULE V MODERN OPTICS **9 Hours**

Energy levels - Principle of laser - Characteristics of laser radiation -Einstein's coefficients- Population inversion - Optical pumping - Pumping mechanisms - Types of laser - CO2 laser - Homo junction GaAs laser. Fiber optics-Principle -Structure of an optical fiber- Types of optical fibers -Applications.

EXPERIMENT 1	Magnetic field along the axis of current carrying coil -Stewart and Gee	**9 Hours**
EXPERIMENT 2	Determination of Hall coefficient of semi-conductor	**9 Hours**
EXPERIMENT 3	Determination of Plank constant	**9 Hours**
EXPERIMENT 4	Determination of wavelength of light by Laser diffraction method	**9 Hours**
EXPERIMENT 5	Determination of wavelength of light by Newton's Ring method	**9 Hours**
EXPERIMENT 6	Determination of laser and optical fiber parameters	**9 Hours**
EXPERIMENT 7	Determination of Stefan's constant	**9 Hours**

TOTAL: 75 HOURS

REFERENCES:

1. Basics of laser physics: for students of science and engineering http://www.springer.com/978-3- 319- 50650-
2. AjoyGhatak, Optics, 5th Ed., Tata McGraw Hill, 2012
3. Arthur Beiser, Shobhit Mahajan and S Rai Choudhury, Concepts of Modern Physics, 6th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2014
4. B. K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt Ltd., New Delhi, 2017.
5. Halliday and Resnick, Fundamentals of Physics, 11 th edition, John Wiley and Sons, Inc, 2018

Course Outcomes: Module II, Module V – Skill development Employability

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1901EN101 BUSINESS COMMUNICATION AND VALUE SCIENCE - I

L	T	P	C
2	0	0	2

The course is a unified approach to enhance language skills of learners with an aim to hone their social skills and to increase their employability. The course is designed to acquaint the learners with the necessary LSRW (Listening/ Speaking / Reading/ Writing) skills needed either for recruitment or further studies abroad for which they attempt international exams like TOEFL, IELTS and GRE. It enables the learners improve their communication skills which are crucial in an academic environment as well as professional and personal lives. It aims to prepare students for careers requiring global business awareness and to develop skills required to work in internationally operating companies and organizations.

Course Objectives

- Understand what life skills are and their importance in leading a happy and well-adjusted life.
- Motivate students to look within and create a better version of self.
- Introduce them to key concepts of values, life skills and business communication.

COURSE CONTENTS

- Overview of the course with immersion activity.
- Overview of biz communication.
- Self-awareness, confidence and communication.
- Essentials of Business communication.
- Application of communication skills.
- Application of Life Skills.
- Assignment.

Module I: **6 hrs**

Essential Grammar – I:

Refresher on Parts of Speech – Listen to an audio clip and note down the different parts of speech followed by discussion. Tenses-Applications of tenses in Functional Grammar (Take a quiz and then discuss) Sentence formation (general & Technical), Common errors, Voices. Show sequence from film where a character uses wrong sentence structure (e.g. Zindagi Na Milegi Dobara where the characters use 'the' before every.

Module II: **6 hrs**

Listening Skills:

Law of nature- Importance of listening skills, Difference between listening and hearing, Types of listening, listen to recording and answer questions based on them.

Module III: **7 hrs**

Speaking Skills:

Presentation on favorite cricket captain in IPL and the skills and values they demonstrate -
Overview of LOL (include activity on introducing self).- presentation on favorite cricket captain in IPL and the skills and values they demonstrate -
Record a conversation between a celebrity and an interviewer.

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Module IV : **7 hrs**

Communication Skills:

Over view of Communication Skills , Barriers of communication Skills, Effective Communication Skills - verbal and non – verbal, Pronunciation, clarity of speech skills, – Role, Importance of Questioning , Skit based on communication skills , Write a newspaper report on an IPL match.

Module V: **6 hrs**

Recognize own strengths and opportunities:

Self-awareness – identity, body awareness, stress management

Expressing self, connecting with emotions, visualizing and experiencing purpose

TOTAL: 32 Hours

Course Outcomes

After completion of the course, the student will be able to

- Recognize the need for life skills and values: (U)
- Recognize own strengths and opportunities: (U) – skill development
- Apply the life skills to different situations: (AP) – skill development
- Understand the basic tenets of communication: (U)
- Apply the basic communication practices in different types of communication: (AP)

Text Book(s)

1. There are no prescribed texts for Semester 1 – there will be handouts and reference links shared.

References

1. English vocabulary in use – Alan Mc'carthy and O'dell.
2. APAART: Speak Well 1 (English language and communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Business Communication – Dr. Saroj Hiremath

Web References

1. Train your mind to perform under pressure- Simon sinek https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-under-pressure-capture- your-flag/
2. Brilliant way one CEO rallied his team in the middle of layoffs https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html
3. Will Smith's Top Ten rules for success https://www.youtube.com/watch?v=bBsT 9omTeh0

Online Resources

1. https://www.coursera.org/learn/learning-how-to-learn
2. https://www.coursera.org/specializations/effective-business-communication

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1901GE103	FUNDAMENTALS OF COMPUTER SCIENCE	L	T	P	C
		3	0	4	5

MODULE I GENERAL PROBLEM SOLVING CONCEPTS AND IMPERATIVE LANGUAGE **6 Hours**

Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C) .Types Operator and Expressions with discussion of variable naming and Hungarian Notation: Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation

MODULE II CONTROL FLOW WITH DISCUSSION ON STRUCTURED AND UNSTRUCTURED PROGRAMMING **6 Hours**

Statements and Blocks, If-Else-If, Switch, Loops - while, do, for, break and continue, Goto Labels, structuredand un- structured programming.

MODULE III FUNCTIONS AND PROGRAM STRUCTURE WITH DISCUSSION ON STANDARD LIBRARY **6 Hours**

Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialization, Recursion, Preprocessor, Standard Library Functions and return types.

MODULE IV POINTERS AND ARRAYS **6 Hours**

Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated.

MODULE V STRUCTURES **6 Hours**

Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral Structures, Table look up, Typedef, Unions, Bit-fields Input and Output: Standard I/O, Formatted Output printf, Formated Input scanf, Variable length argument list, file access including FILE structure, fopen, stdin, sdtout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions.

COURSE OUTCOMES:

Module -II - Skill development

Module - III - Skill development

Module IV - Skill development

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1901MA205	LINEAR ALGEBRA	L	T	P	C
		3	1	0	4

MODULE I MATRICES **09 Hours**

Determinants - Properties of determinants - Matrices - Operations in matrices -Hermitian and Unitary matrices - Rank of a matrix - Solution of system of Linear equations: Cramer's rule - Matrix Inversion method - Rank method.

MODULE II EIGEN VALUES AND EIGEN VECTORS **09 Hours**

Eigen Values and Eigen Vectors of a real matrix - Properties of Eigen Values- Cayley - Hamilton Theorem.

MODULE III MATRIX DECOMPOSITION **09 Hours**

Positive definite matrix -Gauss Elimination method - Gauss Jordan method - LU decomposition -Singular value decomposition.

MODULE IV VECTOR SPACES **09 Hours**

Vector spaces - Subspaces - Linear combinations and linear system of equations - Linear independence and linear dependence - Linear Transformations - Basis and dimensions.

MODULE V INNER PRODUCT SPACES **09 Hours**

Inner products - Norms - Orthogonality of vectors - Projections - Gram-Schmidt orthogonalization - QR decomposition.

TOTAL: 45 HOURS

REFERENCES:

1. Kreyszig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 2017
3. Peter V. O'Neil, Advanced Engineering Mathematics, Seventh Edition, Thomson Learning, 2011
4. Michael. D. Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson, 2002.
5. Gilbert Strang, Introduction to linear algebra, Fifth Edition, ANE Books, 2016.
6. https://machinelearningmastery.com/introduction-matrices-machine-learning/

Course outcomes:

Module-I – Skill development

Module-IV – Skill development

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1901MA206	STATISTICAL MODELING	L	T	P	C
		3	1	0	4

MODULES I LINEAR STATISTICAL MODELS **9 Hours**

Multiple Correlation Ã¢?? Multiple Regression-Analysis of variance: Completely randomized design - Randomized block design.

MODULES II ESTIMATION **9 Hours**

Point estimation - criteria for good estimates (Un-biasedness & Consistency) - Methods of estimation including maximum likelihood estimation. Sufficient Statistic: Concept & examples - Complete sufficiency - Application in estimation.

MODULES III NON-PARAMETRIC INFERENCE **9 Hours**

Comparison with parametric inference - Use of order statistics - Sign test - Wilcoxon signed rank test - Mann-Whitney test - Run test - Kolmogorov-Smirnov test - Spearman's and Kendall's test - Tolerance region.

MODULES IV TIME SERIES ANALYSIS **9 Hours**

Basics of Time Series Analysis - Forecasting - Stationary - ARIMA Models: Identification - Estimation – Forecasting.

MODULES V R PROGRAMMING **9 Hours**

Introduction to R - Functions - Control flow and Loops - Working with Vectors and Matrices - Reading in Data - Writing Data - Working with Data - Manipulating Data - Simulation - Linear model - Data Frame - Graphics in R.

TOTAL: 45 HOURS

REFERENCES:

1. R. Miller, J.E. Freund and R. Johnson, Probability and Statistics for Engineers, Fourth Edition, Pearson, 2015.
2. A. Goon, M. Gupta and B.Dasgupta, Fundamentals of Statistics (Vol. II), The Word Press, 1933.
3. A. Goon, M. Gupta and B.Dasgupta, Fundamentals of Statistics (Vol. I), The Word Press, 1933
4. D.C. Montgomery and E.Peck , Introduction to Linear Regression Analysis, Third Edition, Wiley, 2010.
5. Garrett Grolemund, Hands-on Programming with R, Shroff Publishers & Distributors Pvt Ltd, 2018.

Course outcomes:

Module III, Module V - Skill development

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1901GE202	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		2	1	2	4

MODULES I BASIC TERMINOLOGIES **9 Hours**

Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction

MODULES II LINEAR DATA STRUCTURE **9 Hours**

Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of LinearData Structures

MODULES III NON-LINEAR DATA STRUCTURE **9 Hours**

Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations (search and traversal algorithms and complexity analysis) & Applications of Non-linear Data Structures.

MODULES IV SEARCHING AND SORTING ON VARIOUS DATA STRUCTURES **9 Hours**

Sequential Search, Binary Search, Breadth First Search, Depth First Search, Insertion Sort, Selection Sort, ShellSort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heap Sort, Introduction to Hashing

MODULES V FILES **9 Hours**

Definition, File Organization: Sequential file Organization, Direct file Organization, Indexed Sequential, Hashed and accessing schemes.

TOTAL: 45 HOURS

Course outcomes:

Module I: Skill development
Employability

Module III: Skill development

Module IV: Skill development,
Employability

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1901GE203	PRINCIPLES OF ELECTRONICS	L	T	P	C
		2	0	2	3

MODULES I ELECTRIC CIRCUITS **9 Hours**

Definition of Voltage, Current, Power & Energy, Ohms law, Kirchoffs Law & its applications simple problems, Simple mesh and Node problems, Generation of Alternative EMF, Average value of current and voltage, Form Factor, Peak Factor.

MODULES II SEMICONDUCTOR DIODE AND ITS APPLICATION **9 Hours**

Conductor, Semiconductors & Insulators, Semiconductors: intrinsic & extrinsic, energy band diagram, P&N-type semiconductors, drift & diffusion carriers. Characteristics of PN Junction Diode and Zener diode, Rectifier Circuits Half wave, Full wave circuits, Efficiency, PIV, Ripple factor and AC and DC current and voltage in rectifier.

MODULES III BIPOLARJUNCTION AND FIELDEFFECTTRANSISTOR **9 Hours**

Structure and working of bipolar junction transistor, CB, CC, CE configurations, relation between alpha and beta, Concept of transistor as an amplifier and transistor as a switch, Field Effect Transistors: Construction and characteristics of JFET-parameters of JFET-MOSFET – Depletion and enhancement modes Construction and characteristics.

MODULES IV FEED BACK AMPLIFIER, AND OPERATIONAL AMPLIFIERS **9 Hours**

Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors, Introduction to integrated circuits: operational amplified and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Voltage follower, Comparator, Integrator, Differentiator.

MODULES V DIGITAL ELECTRONICS FUNDAMENTALS **9 Hours**

Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters.

TOTAL: 45 HOURS

LIST OF EXPERIMENTS:

EXPERIMENT 1:	To plot V-I characteristics of PN junction diode.	**3 Hours**
EXPERIMENT 2:	To plot regulation characteristics of half wave rectifier	**3 Hours**
EXPERIMENT 3:	To plot regulation characteristics of Full wave rectifier	**3 Hours**
EXPERIMENT 4:	To plot input-output characteristics of CE configuration of BJT.	**3 Hours**
EXPERIMENT 5:	To study Biasing techniques of BJT- to find stability factor of self-bias, collector to base bias, fixed bias circuits.	**3 Hours**
EXPERIMENT 6:	To plot frequency response of single stage FET amplifier (CS/CD configuration) and find its bandwidth.	**3 Hours**
EXPERIMENT 7:	To study Colpitts Oscillator.	**3 Hours**
EXPERIMENT 8:	Study of OP-AMP circuits: Inverting and Non-inverting Amplifier.	**3 Hours**
EXPERIMENT 9:	Study of basic logic gates and De-Morgan's Theorem.	**3 Hours**
EXPERIMENT 10:	Study of half adder and full adder	**3 Hours**

TOTAL: 30 HOURS

REFERENCES:

1. William Hayt, JVJack, EKemmerly and Steven M Durbin, Engineering Circuits Analysis, Tata McGraw-Hill, 2013
2. L Robert Boylestead, Louis Nashelsky, Electronic Devices and Circuit Theory Pearson Education,2012.
3. J Millman, C. Halkias & Satyabratajit, Electronic Devices and Circuits, Tata McGraw- Hill,2010
4. RamakantA.Gayakwad, OP-AMP and Linear IC's , Prentice Hall of India, 2002.
5. Thomas L.Floyd, Digital Fundamentals, Prentice Hall, 11th Edition, 2015.

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Course outcomes: Module - I – Skill development
Module - II – Employability
Module V – Skill development

1901HS201	FUNDAMENTALS OF ECONOMICS	L	T	P	C
		2	0	0	2

MODULES I MICRO ECONOMICS **6 Hours**

Principles of Demand and Supply - Supply Curves of Firms - Elasticity of Supply; Demand Curves of Households - Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve);

MODULES II WELFARE ANALYSIS **6 Hours**

Consumers and Producers Surplus- Price Ceilings and Price Floors; Consumer Behaviour - Axioms of Choice- Budget Constraints and Indifference Curves; Consumers Equilibrium Effects of a Price Change, Income and Substitution Effects Derivation of a Demand Curve

MODULES III APPLICATIONS **6 Hours**

Tax and Subsidies - Inter temporal Consumption -Suppliers- Income Effect; Theory of Production - Production Function and Isoquants - Cost Minimization; Cost Curves - Total, Average and Marginal Costs - Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition

MODULES IV MACRO ECONOMICS **6 Hours**

National Income and its Components - GNP, NNP, GDP, NDP Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector - Taxes and Subsidies; External Sector - Exports and Imports; Money -Definitions; Demand for Money Transaction and Speculative Demand; Supply of Money - Banks Credit Creation Multiplier; Integrating Money and Commodity Markets - IS, LM Model

MODULES V BUSINESS CYCLES AND STABILIZATION **6 Hours**

Monetary and Fiscal Policy - Central Bank and the Government; the Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment.

MODULES VI BUSINESS CYCLES AND STABILIZATION **6 Hours**

Monetary and Fiscal Policy - Central Bank and the Government; the Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment.

TOTAL: 36 HOURS

REFERENCES:

1. Pindyck, Robert S and Daniel L. Rubinfeld , Microeconomics, Eighth Edition, 2013 .
2. Dornbusch, Fischer and Startz, Macroeconomics, Tenth Edition, Tata Mcgraw Hill, 2012.
3. Paul Anthony Samuelson, William D. Nordhaus, Economics, Nineteenth Edition, McGraw-Hill Education, 2010.
4. Hal R, Varia, Intermediate Microeconomics: A Modern Approach, Eighth Edition Affiliated East- West Press, 2006
5. N. Gregory Mankiw, Principles of Macroeconomics, Seventh Edition, Cengage Learning, 2018.

Course outcomes:

Module - II - skill development

Module - IV - skill development

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1901EN201 BUSINESS COMMUNICATION AND VALUE SCIENCE - II

The course is a unified approach to enhance language skills of learners with an aim to hone their social skills and to increase their employability. The course is designed to acquaint the learners with the necessary LSRW (Listening/ speaking / Reading/ Writing) skills needed either for recruitment or further studies abroad for which they attempt international exams like TOEFL, IELTS and GRE. It enables the learners improve their communication skills which are crucial in an academic environment as well as professional and personal lives. It aims to prepare students for careers requiring global business awareness and to develop skills required to work in internationally operating companies and organizations.

Course Objectives

- Understand what life skills are and their importance in leading a happy and well-adjusted life.
- Motivate students to look within and create a better version of self.
- Introduce them to key concepts of values, life skills and business communication.

COURSE CONTENTS

- Overview of the course with immersion activity.
- Overview of biz communication.
- Self-awareness, confidence and communication.
- Essentials of Business communication.
- Application of communication skills.
- Application of Life Skills.
- Assignment.

Module I: **6 hrs**

Essential Grammar – II : Parts of Speech – Listen to an audio clip and note down the different parts of speech followed by discussion.
Tenses-Applications of tenses in Functional Grammar (Take a quiz and then discuss) Sentence formation (general & Technical), Common errors, Voices. Show sequence from film where a character uses wrong sentence structure (e.g. Zindagi Na Milegi Dobara where the characters use 'the' before every

Module II: **6 hrs**

Vocabulary Enrichment: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary – Read Economic Times, Reader's Digest, National Geographic and take part in a GD, using the words you learnt/liked from the articles.
Group discussion using words learnt- Toastmaster style Table Topics speech with evaluation

Module III : **7 hrs**

Written Communication:
Summary writing- story writing -Email writing: Formal and informal emails, activity- Build your CV – start writing your comprehensive CV including every achievement in your life, no format, no page limit- Create a podcast on a topic that will interest college students

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Module IV: **7 hrs**

Life Skills : Stress management, working with rhythm and balance, colours, and teamwork- Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what can you relate to?- Introduction to life skills What are the critical life skills- Multiple Intelligences Embracing diversity – Activity on appreciation of diversity- Community service – work with an NGO and make a presentation- Create a musical using the learning from unit

Module V: **6 hrs**

Soft Skills:

Join a trek – Values to be learned: Leadership, teamwork, dealing with ambiguity, managing stress, motivating people, creativity, result orientation

TOTAL: 32 Hours

Course Outcomes

After completion of the course, the student will be able to

- Recognize the need for life skills and values: (U)
- Recognize own strengths and opportunities: (U)
- Apply the life skills to different situations: (AP)
- Understand the basic tenets of communication: (U)
- Apply the basic communication practices in different types of communication: (AP)

Text Book(s)

1. There are no prescribed texts for Semester 1 – there will be handouts and reference links shared.

References

1. English vocabulary in use – Alan Mc'carthy and O'dell.
2. APAART: Speak Well 1 (English language and communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Business Communication – Dr. SarojHiremath

Web References

1. Train your mind to perform under pressure- Simon sinek https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-under-pressure-capture- your-flag/
2. Brilliant way one CEO rallied his team in the middle of layoffs https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html
3. Will Smith's Top Ten rules for success https://www.youtube.com/watch?v=bB sT9omTeh0

Online Resources

1. https://www.coursera.org/learn/learning-how-to-learn
2. https://www.coursera.org/specializations/effective-business-communication

Course outcomes:

Module III: Skill development

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1902BS301	FORMAL LANGUAGE AND AUTOMATA THEORY	L	T	P	C
		3	1	0	4

MODULE I REGULAR LANGUAGES AND FINITE AUTOMATA **12 Hours**

Alphabet-languages and grammars- Productions and derivation-Chomsky hierarchy of languages. Regular expressions and languages- Deterministic finite automata (DFA) and equivalence with regular expressions- Nondeterministic finite automata (NFA) and equivalence with DFA- Regular grammars and equivalence with finite automata - Properties of regular languages - Kleene"s theorem - Pumping lemma for regular languages- Myhill- Nerode theorem and its uses- Minimization of finite automata.

MODULE II CONTEXT-FREE LANGUAGES AND PUSHDOWN AUTOMATA **12 Hours**

Context-free grammars (CFG) and languages (CFL)- Chomsky and Greibach normal forms - Nondeterministic pushdown automata (PDA) and equivalence with CFG - Parse trees- Ambiguity in CFG - Pumping lemma for context-free languages – Deterministic pushdown automata- Closure properties of CFLs.

MODULE III LINEAR BOUNDED AUTOMATA AND TURING MACHINES **12 Hours**

Context-sensitive grammars (CSG) and languages - Linear bounded automata and equivalence with CSG. The basic model for Turing machines (TM) - Turing recognizable (recursively enumerable) and Turing- decidable (recursive) languages and their closure properties - Variants of Turing machines - Nondeterministic TMs and equivalence with deterministic TMs - Unrestricted grammars and equivalence with Turing machines – TMs as enumerators.

MODULE IV UNDECIDABILITY **12 Hours**

Church-Turing thesis -Universal Turing machine – The universal and diagonalization languages - Reduction between languages – Rice"s theorem -Undecidable problems about languages.

MODULE V COMPLEXITY THEORY **12 Hours**

Introductory ideas on Time complexity of deterministic and nondeterministic Turing machines - P and NP,NP-completeness - Cook"s Theorem, other NP - Complete problems.

course outcomes:

Module II – Skill development

Module IV – undecidability

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1902BS302	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION TO COMPUTER ARCHITECTURE **9 Hours**

Functional blocks of a computer: CPU, memory, input-output subsystems, control module. Instruction set architecture of a CPU: Registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Outlining instruction sets of some common CPUs.

MODULE II COMPUTER ARITHMETIC **9 Hours**

Data representation: Signed number representation, fixed and floating point representations, character representation. Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and- add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

MODULE III CONTROL MODULE AND PIPELINING **9 Hours**

Introduction to x86 architecture. CPU control MODULE design: Hardwired and micro-programmed design approaches, design of a simple hypothetical CPU. Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Introduction to parallel processing.

MODULE IV PERIPHERAL DEVICES AND THEIR CHARACTERISTICS **9 Hours**

Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB.

MODULE V MEMORY ORGANIZATION AND SYSTEM DESIGN **9 Hours**

Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies. Memory system design: Semiconductor memory technologies, memory organization.

TOTAL: 45 HOURS

Course Outcomes:

Module I: Employability

Module III: Employability

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1902BS303	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION TO OBJECT ORIENTED PROGRAMMING 9 Hours

Single line comments, Local variable declaration within function scope, function declaration, function overloading, stronger type checking, Reference variable, parameter passing -value vs reference, passing pointer by value or reference, Operator new and delete, the typecasting operator, Inline Functions in contrast to macro, default arguments.

MODULE II CONCEPTS OF OBJECT ORIENTED PROGRAMMING 9 Hours

Necessity for OOP, Data Hiding, Data Abstraction, Encapsulation, Procedural Abstraction, Class and Object, Scope of Class and Scope Resolution Operator, Member Function of a Class, private, protected and public Access Specifier, this Keyword, Constructors and Destructors, friend class, error handling (exception)

MODULE III ESSENTIALS OF OBJECT ORIENTED PROGRAMMIG 9 Hours

Operator overloading, Inheritance, Single and Multiple, Class Hierarchy, Pointers to Objects, Assignment of an Object to another Object, Polymorphism through dynamic binding, Virtual Functions, Overloading, overriding and hiding.

MODULE IV FILES, I/O AND GENERIC PROGRAMMING 9 Hours

Streams, Files, Library functions, formatted output Template concept, class template, function template, template specialization.

MODULE V OBJECT ORIENTED DESIGN AND MODELING 9 Hours

UML concept, Use case for requirement capturing, Class diagram, Activity diagram and Sequence Diagramfor design, Corresponding C++ code from design.

TOTAL: 45 HOURS

Course outcomes:

Module II – Skill development
Employability

Module III, Module V – Skill development.

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1902BS304	COMPUTATIONAL STATISTICS	L	T	P	C
		3	0	0	3

MODULE I MULTIVARIATE NORMAL DISTRIBUTION AND MULTIVARIATE REGRESSION 9 Hours

Multivariate Normal Distribution: Multivariate Normal Distribution, Conditional Distribution, Estimationof parameters. Multiple Linear Regression Model: Standard multiple regression models co linearity, outliers, non-normality and autocorrelation, Multivariate Regression: Parameter estimation, Multivariate Analysis of variance and covariance.

MODULE II DISCRIMINANT ANALYSIS AND PRINCIPAL COMPONENT ANALYSIS 9 Hours

Discriminate Analysis: Statistical background, linear discriminate function analysis, Estimating linear discriminate functions and their properties. Principal Component Analysis: Principal components, Algorithm for conducting principal component analysis, H-plot.

MODULE III FACTOR ANALYSIS AND SEGMENTATION ANALYSIS 9 Hours

Factor Analysis: Factor analysis model, Extracting common factors, determining number of factors, Transformation of factor analysis solutions, Factor scores. Clustering and Segmentation Analysis: Introduction, Types of clustering, Correlations and distances, clustering by partitioning methods, hierarchical clustering, overlapping clustering, K-Means Clustering

MODULE IV PYTHON CONCEPTS AND DATA WRANGLING 9 Hours

Python Concepts, Data Structures, Classes: Interpreter, Program Execution, Statements, Expressions, Flow Controls, Functions, Numeric Types, Sequences and Class Constructors, Text & Binary Files - Reading and Writing. Data Wrangling- Combining and Merging Datasets, Reshaping and Pivoting, Data Transformation, String Manipulation, Regular Expressions

MODULE V DATA AGGREGATION AND VISUALIZATION IN PYTHON 9 Hours

Data Aggregation, Group Operations, Time series: Group by Mechanics, Data Aggregation, Group wise Operations and Transformations, Pivot Tables and Cross Tabulations, Time Series Basics, Data Ranges, Frequencies and Shifting. Visualization in Python: Matplotlib package, Plotting Graphs, Controlling Graph, Adding Text, More Graph Types, Getting and setting values, Patches.

TOTAL: 45 HOURS

COURSE OUTCOMES :

Module IV : Skill development, employability.

Module V : Skill development, employability.

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		L	T	P	C
1902BS305	**SOFTWARE ENGINEERING**	**3**	**0**	**2**	**4**

MODULE I INTRODUCTION **9 Hours**

Programming in the small vs. programming in the large-Software project failures and importance ofsoftware quality and timely availability-Engineering approach to software development-Role of software engineering towards successful execution of large software projects-Emergence of software engineering asa discipline-Basic concepts of life cycle models – different models and milestones.

MODULE II SOFTWARE PROJECT MANAGEMENT AND ESTIMATION TECHNIQUES **9 Hours**

Project management: Software project planning–identification of activities and resources-Concepts of feasibility study-Techniques for estimation of schedule and effort-Introduction to Software Requirements Specifications (SRS) and requirement elicitation techniques-Techniques for requirement modeling – decision tables, event tables, state transition tables, Petri nets-Requirements documentation through use cases. Estimation techniques: Software cost estimation models and concepts of software engineering economics- Techniques of software project control and reporting-Introduction to measurement of software size- Introduction to software metrics and metrics based control methods.

MODULE III SOFTWARE QUALITY AND RELIABILITY **9 Hours**

Introduction to the concepts of risk and its mitigation -Internal and external qualities-Process and product quality-Principles to achieve software quality-Introduction to different software quality models like McCall,Boehm, FURPS / FURPS+, Dromey, ISO – 9126-Introduction to Capability Maturity Models (CMM and CMMI)-Introduction to software reliability, reliability models and estimation-Measures of code and design quality-Configuration management.

MODULE IV SOFTWARE TESTING **9 Hours**

Introduction to faults and failures-Basic testing concepts-Concepts of verification and validation-Black boxand white box tests-White box test coverage – code coverage, condition coverage, branch coverage- Basic concepts of black-box tests – equivalence classes, boundary value tests, usage of state tables-Testing use cases-Transaction based testing-Testing for non-functional requirements – volume, performance and efficiency-Concepts of inspection.

MODULE V OBJECT ORIENTED ANALYSIS, DESIGN AND CONSTRUCTION **9 Hours**

Concepts – the principles of abstraction, modularity, specification, encapsulation and information hiding- concepts of abstract data type- Introduction to UML-Class Responsibility Collaborator (CRC) model- Quality of design-Design measurements-Concepts of design patterns-Refactoring-Object oriented construction principles-Object oriented metrics.

TOTAL: 45 HOURS

Course outcomes :

Module II : Skill development, Employability

Module IV : Skill development, Employability.

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1902BS306	FINANCIAL MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9 Hours**

Introduction to Financial Management - Goals of the firm - Financial Environments.

VALUE OF MONEY: Simple and Compound Interest Rates, Amortization, Computing more than once a year, Annuity Factor.

MODULE II VALUATION OF SECURITIES **9 Hours**

Bond Valuation Preferred Stock Valuation, Common Stock Valuation, Concept of Yield and YTM.

RISK AND RETURN: Defining Risk and Return, Using Probability Distributions to Measure Risk,Attitudes Toward Risk, Risk and Return in a Portfolio Context, Diversification, the Capital Asset Pricing Model (CAPM)

MODULE III OPERATING AND FINANCIAL LEVERAGE **9 Hours**

Operating Leverage, Financial Leverage, Total Leverage, Indifference Analysis in leverage study.

COST OF CAPITAL: Concept, Computation of Specific Cost of Capital for Equity - Preference – Debt, Weighted Average Cost of Capital – Factors affecting Cost of Capital 4L.

MODULE IV CAPITAL BUDGETING **9 Hours**

The Capital Budgeting Concept & Process - An Overview, Generating Investment Project Proposals,Estimating Project, After Tax Incremental Operating Cash Flows, Capital Budgeting Techniques, Project Evaluation and Selection - Alternative Methods

MODULE V WORKING CAPITAL MANAGEMENT **9 Hours**

Overview, Working Capital Issues, Financing Current Assets (Short Term and Long Term- Mix), Combining Liability Structures and Current Asset Decisions, Estimation of Working Capital.

CASH MANAGEMENT: Motives for Holding cash, Speeding Up Cash Receipts, Slowing Down Cash Payouts, Electronic Commerce, Outsourcing, Cash Balances to maintain, Factoring.

ACCOUNTS RECEIVABLE MANAGEMENT: Credit and Collection Policies, Analyzing the Credit Applicant, Credit References, Selecting optimum Credit period.

TOTAL: 45 HOURS

Course outcomes:

Module II – Enterpreneurship

Module IV – Enterpreneurship.

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1902BS351	OBJECT ORIENTED PROGRAMMING LAB	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS:

1. Implementation of classes and objects with constructors and destructors.
2. Implementation of operator and function overloading.
3. Implementation of types of Inheritance
4. Implementation of two different classes for adding a private data member using friend function.
5. Implementation of file handling operations.
6. Implementation of templates and UML diagrams.

TOTAL: 30 HOURS

REFERENCES:

1. Object Oriented Programming Lab Manual – A. Baskar, AP/CSE, EGSPEC.
2. Bjarne Stroustrup, The C++ Programming Language, 1e:3rd Edition, Pearson Education, 2015.
3. Debasish Jana, C++ and Object-Oriented Programming Paradigm, 3rd Edition, Prentice Hall of India, New Delhi, 2014.
4. Bjarne Stroustrup, Programming Principles and Practice Using C++, 2nd Edition, Addison Wesley, 2014.
5. Bjarne Stroustrup, The Design and Evolution of C++, Addison-Wesley Professional, 2013.

Course outcomes: EXP 2 and 5 - Skill development

1902BS352	COMPUTATIONAL STATISTICS LAB	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS:

1. Basic Python Programs
2. Program using String Operations
3. Program on python Data structures
4. Perform various numpy operations and special functions
5. Draw statistical graphics using seaborn
6. Implement k-means, logistic and time series algorithm using Scikit-learn
7. Multi Variable analysis with regression in python
8. Factor analysis with python
9. Data Aggregation in python
10. Visualization in python using Altair

TOTAL: 30 HOURS

REFERENCES:

1. Computational Statistics Lab Manual – G. Murugan, AP/CSE, EGSPEC.
2. T.W. Anderson, "An Introduction to Multivariate Statistical Analysis", Wiley, 3rd Edition, 2003
3. J.D. Jobson, "Applied Multivariate Data Analysis", Vol I & II, Springer, 2012
4. Magnus Lie Hetland, "Beginning Python: From Novice to Professional", Apress, 2nd Edition,2008
5. Stanley A Mulaik, "Foundations of Factor Analysis", CRC Press, 2nd Edition, 2009
6. Douglas C. Montogomery, Elizabeth A. Peck, G. Geoffrey Vining, "Introduction to Linear Regression Analysis", Wiley,5th Edition,2012
7. Mark Lutz, "Programming Python", Shroff Publishers, 3rd Edition, 2006
8. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress, 2009
9. Wes Mc Kinney, "Python for Data Analysis", O'Reilly, 2018

Course outcomes:

Experiments 1, and 5 - Skill development

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1904GE351 **LIFE SKILLS: SOFT SKILL**

L	T	P	C
0	0	2	1

MODULE I INTRODUCTION TO SOFT SKILLS **6 Hours**

Soft Skills an Overview - Basics of Communication – Body Language – Positive attitude –Improving Perception and forming values – Communicating with others.

MODULE II TEAM VS TRUST **6 Hours**

Interpersonal skills – Understanding others – Art of Listening - Group Dynamics –Essential of an effective team - Individual and group presentations - Group interactions – Improved work Relationship .

MODULE III SELLING ONESELF **6 Hours**

How to brand oneself – social media – job hunting – Resume writing – Group Discussion – Mock G.D. Interview skills – Mock Interview.

MODULE IV CORPORATE ETIQUETTE **6 Hours**

What is Etiquette – Key Factors – Greetings – Meeting etiquette – Telephone etiquette – email etiquette – Dining etiquette – Dressing etiquette.

MODULE V LEARNING BY PRACTICE **6 Hours**

1. My family. Myself. 2. Meeting people. Making Contacts. 3. A city. Getting about town. 4. Our flat. Home life. 5. Travelling. Going abroad. 6. Going through Customs.7. At a hotel. 8. Shopping. 9. Eating out. 10. Making a phone call.11.A modern office.12. Discussing business.

TOTAL: 30 HOURS

REFERENCES:

1. Dr. K. Alex, "soft skills", Third Edition, S.Chand& Publishing Pvt Limited, 2009.
2. Arunakoneru, "Professional Communication", Second Edition, Tata McGraw-Hill Education, 2008.
3. D.K.Sarma, "You & Your Career", First Edition Wheeler Publishing & Co Ltd, 1999.
4. Shiv Khera "You Can Win", Third Edition Mac Millan Publisher India Pvt Limited, 2005.

Course outcomes: Module II & III – Skill development

1901MCX02 **CONSTITUTION OF INDIA**

L	T	P	C
2	0	0	0

MODULE I

Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution.

MODULE II

Union Government: Executive-President, Prime Minister, Council of Minister
State Government: Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government

MODULE III

Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties

MODULE IV

Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India

MODULE V

Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women

TOTAL: 30 HOURS

REFERENCES:

1. D.D. Basu, Introduction to the constitution of India, Lexis Nexis, New Delhi.
2. Subhash Kashyap, Our Parliament, National Book Trust, New Delhi.
3. Peu Ghosh, Indian Government &Politics, Prentice Hall of India, New Delhi.
4. B.Z. Fadia & Kuldeep Fadia, Indian Government &Politics, Lexis Nexis, New Delhi.

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Course outcomes:

Module I – Skill development

Module V – Skill development

1902BS401	OPERATING SYSTEMS	L	T	P	C
		3	0	2	4

MODULE I INTRODUCTION **9 Hours**

Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.

MODULE II PROCESS MANAGEMENT SYSTEM **9 Hours**

Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching, Threads: Definition, Various states, Benefits of threads, Types of threads, Concept of multi-threads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

MODULE III IPC AND DEADLOCKS **9 Hours**

Concurrent processes, precedence graphs, Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Strict Alternation, Peterson's Solution, The Producer/ Consumer Problem, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem, Barber's shop problem, Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery, Concurrent Programming: Critical region, conditional critical region, monitors, concurrent languages, communicating sequential process (CSP); Deadlocks - prevention, avoidance, detection and recovery.

MODULE IV MEMORY MANAGEMENT SYSTEM **9 Hours**

Memory Management: Basic concept, Logical and Physical address maps, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction, Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page allocation, Partitioning, Paging, Page fault, Working Set, Segmentation, Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU), I/O Hardware: I/O devices, Device controllers, Direct Memory Access, Principles of I/O.

MODULE V FILE AND DISK MANAGEMENTSYSTEM **9Hours**

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed),Free-space management (bit vector, linked list, grouping), directory implementation(linear list, hash table), efficiency and performance, Disk Management: Disk structure, Disk scheduling- FCFS, SSTF, SCAN, C-SCAN, Diskreliability, Disk formatting, Boot-block, Bad blocks.

TOTAL: 45 HOURS

Course outcomes :

Modale II – Skill development

Modale IV – Employability

Modale V – Skill development, Employability

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1902BS402	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

MODULE I DATABASE ARCHITECTURE AND DATA MODEL **9 Hours**

Introduction to Database-Hierarchical, Network and Relational Models. Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language(DML) Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations

MODULE II RELATIONAL QUERYAND DATABASE DESIGN **12 Hours**

Relational query languages: Relational algebra, Tuple and domain relational calculus,SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL,ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms, Dependency preservation, Lossless design

MODULE III QUERY PROCESSING AND STORAGE **8 Hours**

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices, B-trees, Hashing

MODULE IV TRANSACTION PROCESSING **8 Hours**

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery

MODULE V DATABASE SECURITY **7 Hours**

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

TOTAL: 45 HOURS

Course outcomes:

Module II - Employability

Module V - Employability

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1902BS403	SOFTWARE DESIGN WITH UML	L	T	P	C
		3	0	2	4

MODULE I **INTRODUCTION TO ON OBJECT ORIENTED TECHNOLOGIES AND THE UML METHOD** **9 Hours**

Software development process: The Waterfall Models. The Spiral Model-The Software Crisis-description of the real world using the Objects Model- Classes, inheritance and multiple - configurations-Quality software characteristics- Description of the Object Oriented Analysis process vs. the Structure Analysis Model.

MODULE II **INTRODUCTION TO THE UML LANGUAGE** **9 Hours**

Standards-Element s of the language- General description of various models-The process of Object Oriented software development - Description of Design Patterns - Technological Description of Distributed Systems.

MODULE III **REQUIREMENTS ANALYSIS USING CASE MODELING** **9 Hours**

Analysis of system requirements - Actor definitions - Writing a case goal - Use Case Diagrams - Use Case Relationships.

MODULE IV **TRANSFER FROM ANALYSIS TO DESIGN IN THE CHARACTERIZATION STAGE INTERACTION DIAGRAMS.** **9 Hours**

Description of goal-Defining UML Method, Operation, Object Interface, Class-Sequence Diagram-Finding objects from Flow of Events-Describing the process of finding objects using a Sequence
Diagram- Describing the process of finding objects using a Collaboration Diagram.

MODULE V **THE LOGICAL VIEW DESIGN STAGE: THE STATIC STRUCTURE DIAGRAMS.** **9 Hours**

The Class Diagram Model- Attributes descriptions- Operations descriptions-Connections descriptions in the Static Model -Association, Generalization, Aggregation, Dependency, Interfacing, Multiplicity.

TOTAL: 45 HOURS

Course Outcomes:

Module I, Module II – Employability

Module IV – Employability.

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1902BS404	MARKETING RESEARCH AND MARKETING MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **10 Hours**

Marketing Concepts and Applications: Introduction to Marketing & Core Concepts, Marketing of Services, Importance of marketing in service sector-Marketing Planning & Environment: Elements of Marketing Mix, Analyzing needs &trends in Environment -Macro, Economic, Political, Technical & Social- Understanding the consumer: Determinants of consumer behavior, Factors influencing consumer behavior –Market Segmentation: Meaning &Concept, Basis of segmentation, selection of segments, Market Segmentation strategies, Target Marketing, Product Positioning.

MODULE II MARKETING MIX **9 Hours**

Concept, elements, 7 Ps of marketing-Product Management: Product decision and strategies, Packaging, Product Life cycle concept, New Product development & strategy, Stages in New Product development, Branding

MODULE III PRICING, PROMOTION AND DISTRIBUTION STRATEGY **10 Hours**

Pricing Policies & Practices – Pricing Methods & Price determination Policies. Marketing Communication –The promotion mix, Advertising & Publicity, 5 M's of Advertising Management,Personal selling, Public Relations. Marketing Channels, Retailing, Logistics & Supply Chain.
Marketing Communication, Advertising

MODULE IV MARKETING RESEARCH **10 Hours**

Introduction, Scope, Objectives & Limitations, Types of Market Research, Marketing Research Techniques, Survey Questionnaire design & drafting, Pricing Research, Media Research, Qualitative Research, Data Analysis: Use of various statistical tools – Descriptive & Inference Statistics, Statistical Hypothesis Testing, Multivariate Analysis –Discriminate Analysis, Cluster Analysis, Segmenting, Factor Analysis

MODULE V INTERNET MARKETING **6 Hours**

Introduction to Internet Marketing. Mapping fundamental concepts of Marketing (7Ps, STP); Strategy and Planning for Internet Marketing.

TOTAL: 45 HOURS

Course outcomes:

Module III, Module IV - Employability

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1901GE401	INTRODUCTION TO INNOVATION, IP MANAGEMENT AND ENTREPRENEURSHIP	L	T	P	C
		3	0	0	3

MODULE I **INNOVATION: WHAT AND WHY?** **9 Hours**

Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations. Class Discussion-Is innovation manageable or just a random gambling activity?

MODULE II **BUILDING AN INNOVATIVE ORGANIZATION** **9 Hours**

Creating new products and services, Exploiting open innovation and collaboration, Use of innovation for starting a new venture .Class Discussion- Innovation: Co-operating across networks vs. 'go-it-alone' approach.

MODULE III **ENTREPRENEURSHIP** **9 Hours**

Opportunity recognition and entry strategies – Entrepreneurship as a Style of Management-Maintaining Competitive Advantage-Use of IPR to protect Innovation.

MODULE IV **ENTREPRENEURSHIP- FINANCIAL PLANNING** **7 Hours**

Financial Projections and Valuation- Stages of financing -Debt, Venture Capital and other forms of Financing.

MODULE V **INTELLECTUAL PROPERTY RIGHTS (IPR)** **11 Hours**

Introduction and the economics behind development of IPR: Business Perspective-IPR in India – Genesis and Development-International Context-Concept of IP Management, Use in marketing. Types of Intellectual Property: Patent-Procedure, Licensing and Assignment, Infringement and Penalty-Trademark-Use in marketing, example of trademarks- Domain name -Geographical Indications- What is GI, Why protect them? -Copyright- What is copyright -Industrial Designs- What is design? How to protect? Class Discussion-Major Court battles regarding violation of patents between corporate companies

TOTAL: 45 HOURS

Course outcomes:

Module -IV – Entrepreneurship

Module-V – Entrepreneurship

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1901MA404 **OPERATIONS RESEARCH**

L	T	P	C
3	0	0	3

MODULE I LINEAR PROGRAMMING **9 Hours**

Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Basic concepts, Special cases – infeasibility, unboundedness, redundancy and degeneracy, Sensitivity analysis. Simplex Algorithm–slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations. Duality – formulation, results, fundamental theorem of duality, dual-simplex and primal-dual algorithms.

MODULE II TRANSPORTATION AND ASSIGNMENT PROBLEMS **9 Hours**

TP - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced &unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution. AP-Examples, Definitions–decision variables, constraints formulation, Balanced &unbalanced situations, Solution method–Hungarian, test for optimality (MODI method), degeneracy &its resolution.

MODULE III PERT – CPM AND INVENTORY CONTROL **9 Hours**

Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off Inventory Control: Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models–EOQ, POQ & Quantity discount models. EOQ models for discrete MODULEs, sensitivity analysis and Robustness.

MODULE IV QUEUING THEORY **9 Hours**

Definitions– queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase). Kendall"s notation, Little"s law, steady state behavior, Poisson"s Process & queue, Models with examples - M/M/1 and its performance measures; M/M/m and its performance measures.

MODULE V SIMULATION METHODOLOGY **9 Hours**

Definition and steps of simulation, random number, random number generator, Discrete Event System Simulation–clock, event list, Application in Scheduling, Queuing systems and Inventory systems.

TOTAL: 45 HOURS

REFERENCES:

1. Operations Research: An Introduction. H.A. Taha.
2. Linear Programming. K. G. Murthy.
3. Linear Programming. G. Hadley.
4. Principles of OR with Application to Managerial Decisions. H.M. Wagner.
5. Introduction to Operations Research. F.S. Hiller and G.J. Lieberman.
6. Elements of Queuing Theory. Thomas L. Saaty.
7. Operations Research and Management Science, Hand Book: Edited By A. Ravi Ravindran.
8. Management Guide to PERT/CPM Wiest & Levy.

Course outcomes:

Module II, Module-III – Skill development

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1902BS451	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS:

EXPERIMENT 1

Working with SQL commands like DDL, DML, TCL, and DCL

EXPERIMENT 2

Execute simple queries using joins and Integrity constraints.

EXPERIMENT 3

Create database relation and check for normal forms.

EXPERIMENT 4

Implement Cursor and trigger in PL/SQL block.

EXPERIMENT 5

Write PL/SQL block Programs using exception handling

EXPERIMENT 6

Design a PL/SQL blocks using subprograms namely functions and procedures

TOTAL: 30 HOURS

COURSE OUTCOMES:

CO1: Understand the architecture of database and the models for designing database. – Skill development
CO2: Develop solutions to a broad range of query and remove the anomalies using normalization.
CO3: Understand database query processing and storage strategies.
CO4: Analyze the basic issues of transaction processing, concurrency control and recovery – Skill development
CO5: Outline the concept of database security.

REFERENCES:

1. Database System Concepts. Abraham Silber schatz, Henry F. Korth and S. Sudarshan.
2. Principles of Database and Knowledge – Base Systems, Vol 1 by J. D. Ullman.
3. Fundamentals of Database Systems. R. Elmasri and S. Navathe.
4. Foundations of Databases. Serge Abiteboul, Richard Hull, Victor Vianu.

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1901EN301	BUSINESS COMMUNICATION & VALUE SCIENCE – III	L	T	P	C
		1	0	4	3

MODULE I FRAMEWORK OF ANALYSIS **9 Hours**

Concepts: Person analysis: SWOT analysis - SWOT and Life Positions –Analysis of others' lives – Analysis of one's own life. - TOWS Analysis: How to turn threat into opportunity – VUCA - Volatility, uncertainty, complexity and ambiguity - Application of analysis in real life scenarios – Maslow's theory of motivation.

Activity: SWOT analysis of a well-known individual's life - Creating one's own SWOT – TED talk on biomimicry – Group activity - Presentation on strengths identified to survive in the VUCA World – Watching videos of motivation & discussion.

MODULE II PLURALISM IN CULTURAL SPACES **9 Hours**

Concepts: Identifying Pluralism in cultural spaces - uniqueness and differences - Global, local and Trans locational cultures – benefits, differences and implications of multi-culture – Gender awareness - Roles and relations of different genders.

Activity: Group activity – Exploring cultures and traditions of different states – Performing Indian dance forms - Debate on Global, local and Translocation impacts – cultural misunderstanding – Group discussion on implications of cross cultural communication –Gender awareness campaign: College, Workplace, Family, Friend

MODULE III ROLE OF SCIENCE IN NATION BUILDING **9 Hours**

Concepts: Role of science in nation building – Pre & Post Independent scientific inventions and inventors – development of Information Technology – Technical writing – Introduction and application of Technical writing

Activity: Discussion on the role of scientists and mathematicians – Presentation on eminent scientists and mathematicians – Quiz on Scientists and inventions – Writing a technical article - Explaining something to visually impaired person.

MODULE IV ARTIFICIAL INTELLIGENCE **9 Hours**

Concepts: Artificial Intelligence – Recognizing the importance of AI– Future of AI– Communicating with machines – Technical writing in profession.

Activity: Skit on Voice Assistant in future – Discussion on AI in everyday life – Deliberation on future colleges and workplaces - Watching Dr Bimal Ray's videos on cryptology–Explaining IOT

MODULE V PROJECT CAMPAIGN **9 Hours**

Concepts: Social consciousness – contributing to society.

Activity: Project visit to rural area/ underprivileged parts of city to address some of the local issues; if relevant, suggest a practical technology solution to the issues.

TOTAL: 45 HOURS

Course outcomes:

Module I - I – Skill development
Module - III – Skill development
Module - IV – Skill development

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1904GE451	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	1

MODULE I VOCABULARY USAGE **6 Hours**

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

MODULE II COMPREHENSION ABILITY **6 Hours**

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages.

MODULE III BASIC GRAMMAR AND ERROR DETECTION **6 Hours**

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

MODULE IV REARRANGEMENT AND GENERAL USAGE **6 Hours**

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

MODULE V APPLICATION OF VERBAL ABILITY **6 Hours**

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - EmailEtiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.

TOTAL: 30 HOURS

Course outcomes :

Module I : skill development

Module III : skill development

Module V : skill development.

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1901MCX01	ENVIRONMENTAL STUDIES	L	T	P	C
		3	0	0	0

MODULE I ECOSYSTEMS AND BIODIVERSITY **10 Hours**

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Documentation of the medicinal plants in your native place

MODULE II NATURAL RESOURCES **10 Hours**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Documentation of the effect of modern Agriculture in your nearby Village

MODULE III ENVIRONMENTAL POLLUTION **9 Hours**

Definition – Source, causes, effects and control measures of: (a) Air pollution - Mitigation procedures- Control of particulate and gaseous emission, Control of SOX, NOx, CO and HC) -Technology for capturing CO2 (metallo organic frame works) (b) Water pollution – Waste water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies. Documentation study of local polluted site – Urban / Rural / Industrial / Agricultural

MODULE IV SOCIAL ISSUES AND THE ENVIRONMENT **8 Hours**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management -environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – consumerism and waste products – environment protection act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark) central and state pollution control boards- disaster management: floods, earthquake- Public awareness. Analyze the recent steps taken by government of India to prevent pollution (Green India and Clean India)

MODULE V HUMAN POPULATION AND THE ENVIRONMENT **8 Hours**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA) -GIS-remote sensing-role of information technology in environment and human health – Case studies. Documentation study of the Human health and the environment in nearby Hospital (Statistical report)

TOTAL: 45 HOURS

REFERENCES:

1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi,2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.
5. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006
6. Ravikrishnan "Environmental Science and Engineering" Sri Krishna Hi-tech Publishing Company Pvt.

Course outcomes:
Module I & Module IV – Skill Development

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