

**KOLHAPUR INSTITUTE OF TECHNOLOGY'S
COLLEGE OF ENGINEERING
(EMPOWEREDAUTONOMOUS)
GOKUL SHIRGAON, KOLHAPUR**



Department of Computer Science and Business Systems

Curriculum Structure and Syllabus for

First Year B.Tech in

Computer Science and Business Systems

(As Per NEP, 2020)

Assessments:**Teacher Assessment:**

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE-1	10
MSE	30
ISE-2	10
ESE	50

ISE-1 and ISE-2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:**Unit 1: Data Types and Operators****07 Hrs.**

Levels of programming language, Introduction to Programming Paradigms, Algorithm, Flowchart, for problem solving with Sequential Logic Structure, Introduction to imperative language; syntax and constructs of a specific language. Types Operator and Expressions: 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, variable naming, Hungarian Notation

Unit 2: Branching and Loop Statements**08 Hrs.**

Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops: while do, for, break and continue, Go to Labels, structured and un- structured programming

Unit 3: Functions**08 Hrs.**

Functions and Program Structure, standard library: 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,

Unit 4 : Pointers and Array	08 Hrs.
Pointers and Arrays: 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.	
Unit 5 : Structures and File System	08 Hrs.
Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral Structures, Table look up, typed ef, 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, p error and error. h, Line I/O, related miscellaneous functions	
Unit 6 : Unix System Interface	06 Hrs.
Unix system Interface: File Descriptor, Low level I/O – read and write, Open, create, close and unlink, Random access – l seek, Discussions on Listing Directory, Storage allocator. Programming Method: Debugging, Macro, User Defined Header, User Defined Library Function, make file utility.	
Textbooks:	
1. The C Programming Language – 2nd edition - B.W.Kernighan and - PHI 2. Programming in C - 2nd edition - B.Gottfried - Schaum Outline	
References:	
1. C: The Complete Reference – 4th edition- Herbert Schidt - McGraw Hill. 2. Let Us C - 14th edition -Yashvant Kanetkar -BPB Publications	

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Course Contents:**Unit 1: Logic****08 Hrs.**

Propositional calculus - propositions and connectives, syntax; Semantics – truth assignments and truth tables, Validity and satisfiability tautology; adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility - natural deduction system and axiom system; Soundness and completeness.

Unit 2: Lattice & Boolean Algebra**08 Hrs.**

Sets & Relations, Poset, Lattice, Boolean algebra, principle of duality, Canonical form, Karnaugh map.

Unit 3: Abstract Algebra**07 Hrs.**

Algebraic structures: Semi group, Monoids, Groups, Subgroups, Abelian groups, cyclic group, Rings, Integral domain, Fields

Unit 4 : Graph theory**07 Hrs.**

Graphs and digraphs, complement, isomorphism, adjacency matrix, Connectedness and reachability, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments.

Unit 5 : Trees**07 Hrs.**

Trees, Planar graphs, Euler's formula, dual of a planar graph, Independence number and Clique number, Chromatic number, Graph coloring, Rooted tree, Prefix code and Huffman coding method.	
Unit 6 : Combinatorics	08 Hrs.
Introduction to Basic Counting Principles, Formulae behind nPr , nCr - Balls and Pins problems, Pigeonhole Principle, Recurrence relations, Generating Functions, Introduction to Proof Techniques-Mathematical Induction.	
Textbooks:	
1. Discrete Mathematics and its applications - Keneth H.Rosen - Khanna Publishers 2. Modern Algebra - A.R.Vashistha - Krishna Prakashan 3. Applied Combinatorics - Alan Tucker – Wiley 4. A text book on discrete Mathematics - C.V.Sastry, Rakesh Naik - Wiley	
References:	
1. Elements of Discrete Mathematics – T.Veerarajan - Tata MacGraw. 2. Graph Theory with Applications to Engineering and Computer Science - Narsing Deo - Prentice Hall of India 3. Topics in Algebra - N. Herstein - John Wiley and Sons 4. Discrete Mathematics - T.Veerarajan - Tata MacGraw 5. Digital Logic & Computer Design - M. Morris Mano - Pearson	

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Course Contents:**Unit 1: Introduction****05 Hrs.**

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

Unit 2: DC Circuits**07 Hrs.**

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

Unit 3: Electrostatics, Capacitors and Batteries**04 Hrs.**

Electrostatic field, electric field strength, concept of permittivity in dielectrics, capacitor composite, dielectric capacitors, capacitors in series & parallel, energy stored in capacitors, charging and discharging of capacitors, Principle of batteries, types, construction and application.

Unit 4: AC Fundamentals	05 Hrs.
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, single phase and three phase concept.	
Unit 5 : Electromechanics	04 Hrs.
Electricity and Magnetism, magnetic field and Faraday's law, self and mutual inductance, Ampere's law, Magnetic circuit, Magnetic material and B-H Curve, Electromechanical energy conversion.	
Unit 6: Sensors, Measurements and Wiring Systems	05 Hrs.
Introduction to measuring devices/sensors and transducers (Piezoelectric & Thermo-couple) related to electrical signals, Basic concept of indicating and integrating instruments, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-Phase power). Basic layout of distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Safety devices and system.	
Textbooks:	
1. Electric Machinery – 6th edition - A.E. Fitzgerald, Kingsely Jr.Charles, D.Unmans – Tata McGraw Hill 2. A Textbook of Electrical Technology, vol.I - 1st edition - Stephen B.L.Theraja - S. Chand and Company Ltd., New Delhi 3. Basic Electrical Engineering – 1st edition – V.K.Mehta - S. Chand and Company Ltd., New Delhi 4. Theory and problems of Basic Electrical Engineering – 2nd edition - J. Nagrath and Koth - India Pvt. Ltd	
References:	
1. Basic of Electrical Engineering – 3rd edition - T. K. Nagsarkar and M. S. Sukhija - Oxford University Press 2011. 2. Introduction to Electrodynamics – 4th edition – D. J. Griffiths - Cambridge University Press 3. Engineering Circuit Analysis - 8th edition - William H. Hayt& Jack E. Kemmerly - McGraw-Hill Company Inc 4. Fundamentals of Electrical and Electronics Engineering - 2nd edition - Prentice Hall (India) Pvt. Ltd.	

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Course Contents:**Unit 1: Oscillation****06 Hrs.**

Periodic motion-simple harmonic motion-characteristics of simple harmonic motion, vibration of simple spring 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.

Unit 2: Interference, Diffraction and Polarization**07 Hrs.**

Theory of interference fringes, types of interference-Division of wavefront and Division of Amplitude Fresnel's prism-Newton's 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 and its application. 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.

Unit 3: Laser and Fiber optics**04 Hrs.**

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO₂ and Neodymium lasers; Properties of laser beams, applications of lasers in engineering. Fiber optics: Structure, Principle, Advantages and Applications, Types of optical fibers.

Unit 4 : Crystallography, Semiconductor Physics, and Quantum Mechanic	07 Hrs.
Basic terms-types of crystal systems, Bravais lattices, miller indices, d spacing, Atomic packing factor for SC, BCC, FCC and HCP structures. Basic concept of Band theory Conductor, Semiconductor and Insulator; Planck's quantum theory- de-Broglie hypothesis, Matter waves properties, , Heisenberg's Uncertainty principle, time independent and time dependent Schrödinger's wave equation, Physical significance of wave function, Particle in a one dimensional potential box.	
Unit 5 : Basic Idea of Electromagnetisms	06 Hrs.
Scalar and Vector Fields, Del operator- concept of gradient divergence & curl. Maxwell's equations in differential and integral forms for different media. Equation of continuity, Maxwell's modification in Ampere's law, concept of displacement current. Concept of electromagnetic waves and light - classical wave equation, speed of light.	
Unit 6 : Thermodynamics	04 Hrs.
Introduction, System -surrounding, Heat Capacity and Work, Zeroth law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes.	
Textbooks:	
1. A textbook of Engineering Physics– 11th edition - M.N. Avadhanalu & Kshirsagar – Chand & Comp. Ltd. Delh 2. Engineering Physics - 1st edition - Shailendra Sharma- Pearson Publication 3. Physics Principles & Applications– 7th edition – Dougus Giancoli - Pearson Publication 4. Concepts of Physics– 5th edition - A Beiser - McGraw Hill 5. Fundamentals of Physics – 3rd edition - David Halliday, Robert Resenick & J. Walker - Wiley Plus	
References:	
Modern Engineering Physics – 4th edition - A.S.Vasudeva- Tata Mc. Graw S.Chand. Engineering Physics– 1st edition – Dattu R Joshi - Cambridge University Press Basic Quantum Mechanics – 1st edition - Ajoy Ghatak - Laxmi Optics- 5th edition - Ajoy Ghatak - Tata McGraw. University Physics – 13th edition - Sears & Zemansky - Addison-Wesley	

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Course Contents:**Unit 1: Introduction to statistics****08 Hrs.**

- 1.1 Definition, Data, various types of data.
- 1.2 Graphical Representation of data.
- 1.3 Measures of Location: Mean, Median, Mode and simple properties
- 1.4 Measures of Dispersion: Variance, Standard Deviation, Coefficient of Variation.
- 1.5 Bivariate data, Marginal and Conditional frequency distribution.

Unit 2: Probability**07 Hrs.**

- 2.1 Statistical Probability with Properties.
- 2.2 Conditional probability.
- 2.3 Bayes Theorem

Unit 3: Random Variables**08 Hrs.**

- 3.1 Random Variable and types of Random Variable.
- 3.2 Two - dimensional random Variable.
- 3.2 Probability Distribution, Discrete and Continuous Probability Distribution.
- 3.2 Expected values, moments and its properties.
- 3.4 Moment generating function and their properties.

Unit Probability Distributions - I**07 Hrs.**

- 4.1 Binomial Distribution.
- 4.2 Poisson Distribution.
- 4.3 Geometric Distribution.
- 4.4 Normal Distribution.

Unit 5 : Probability Distributions - II	08 Hrs.
5.1 Uniform Distribution. 5.2 Exponential Distribution. 5.3 Chi-square Distribution. 5.4 t – Distribution. 5.5 F Distribution.	
Unit 6 : Sampling Techniques (Theory Only)	07 Hrs.
6.1 Random sampling. 6.2 Random Sampling from Finite and Infinite populations. 6.3 Standard Error. 6.4 Simple random sampling with and without replacement. 6.5 Stratified sampling.	
Textbooks:	
1. Introduction of Probability Models– S. M. Ross - Academic Press, N.Y. 2. Fundamentals of Statistics - I & II - A. Goon, M. Gupta and B. Dasgupta - World Press 3. Higher Engineering Mathematics - B. S. Grewal - Khanna Publication, Delhi	
References:	
1. A first course in Probability– S. M. Ross - Prentice Hall. 2. Probability and Statistics for Engineers– 4 th edition – I. R. Miller, J.E. Freund and R - PHI 3. Introductions to the Theory of Statistics- A. M. Mood, F.A. Graybill ,D.C. Boes - McGraw Hill Education 4. Advanced Engineering Mathematics – 7 th edition - Peter V. O'Neil- Pearson 5. Advanced Engineering Mathematics – 2 nd edition - M. D. Greenberg- Tata McGraw. 6. Applied Mathematics – 1 st & 2nd edition - P. N. Wartikar and J. N. Wartikar- Vidyarthi 7. Prakashan.	

Title of the Course: Business Communication & Value Science - I										L	T	P	Credit	
Course Code: UCBHS0106										1	-	-	1	
Course Pre-Requisites: English subject at HSC														
Course Description: The course intends to make learners understand the importance of life skills and develop various communication skills required in day today life as well as in business contexts.														
Course Learning Objectives:														
1. Understand what life skills are and their importance in leading a happy and well-adjusted life.														
2. Motivate students to look within and create a better version of self.														
3. Introduce them to key concepts of values, life skills and business communication														
4. To make students better in English grammar to perform best in verbal aptitude assessment														
5. To hone their listening and speaking skills														
Course Outcomes:														
CO		After the completion of the course the student should be able to								Bloom's Cognitive				
										Level	Descriptor			
CO1		Recognize the need for life skills and values (R)								I	Knowledge			
CO2		Recognize own strengths and opportunities (U).								I	Knowledge			
CO3		Apply the life skills to different situations (AP).								III	Apply			
CO4		Understand the basic tenets of communication (U)								II	Understand			
CO5		Apply the basic communication practices in different types of communication								III	Apply			
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								-	-	1		--		
CO2								2	2	3		1		
CO3								2	2	2		1		
CO4								1	-	2		-		
CO5								1	2	2				

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Course Contents:**Unit 1: Communication and Values****04 Hrs.**

- Introduction to Values - Importance and necessity
- Communication basics: Importance, process, levels
- Forms/methods: verbal and non-verbal
- Barriers and solutions

Unit 2: Communication in Business Context**04 Hrs.**

- Overview of Business Communication: Flow/channels of business communication (Internal, External, Vertical, Horizontal, Diagonal, Grapevine), Problems and Solutions

Unit 3: Verbal Aptitude**03 Hrs.**

- Grammar: parts of speech-using articles, conjunctions and prepositions; using appropriate tenses, degree, voice
- Vocabulary: Affixation, synonyms and antonyms, idioms, confusables-homophones and homonyms.
- Syntax: types of sentences, spotting errors in sentences with justification

Unit 4 : Enhancing Listening, Speaking, and Thinking Skills**03 Hrs.**

- Effective listening: Law of nature- Importance of listening skills, Difference between listening and hearing, process and advantages of listening, poor listening habits, types of listening, strategies for effective listening, listening barriers
- Effective speaking: Importance, various oral business contexts/situations, preparing effective public speeches, expressing oneself clearly
- Thinking as a learning skill.

Unit 5 : Formal Business Correspondence-1	03 Hrs.
•Principles, structure (elements) •Layout (complete block, modified block, semi-block)	
Unit 6 : Formal Business Correspondence-2	03 Hrs.
Types of letters (leave application, enquiry and replies, claim and adjustment)	
Textbooks:	
1. Communication Skills– 3rd edition - Meenakshi Raman and Sangeeta Sharma – Oxford University Press (OUP) 2. Communication Skills – 2nd edition - Sanjay Kumar and Pushpa Lata- Oxford University Press (OUP)	
References:	
English vocabulary in use – Alan Mc’Carthy and O’dell APAART: Speak Well 1 (English language and communication) APAART: Speak Well 2 (Soft Skills) 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=bBsT9omTeh0 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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One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	25
ESE	25

ISE are based on practical performance/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc. ESE: Assessment is based on oral examination

Course Contents:

Experiment No. 1: Write a C program to display a given pattern using loops..	02 Hrs.
Experiment No. 2: Write a C program to print source code as program output.	02 Hrs.
Experiment No. 3: Write a C program to demonstrate use of array and function (simple and recursive function).	02 Hrs.
Experiment No. 4: Write a C program to count the lines, words and characters in a given text.	02 Hrs.
Experiment No. 5: Write a C program to demonstrate the use of structure and pointers.	02 Hrs.
Experiment No. 6: Write a program to demonstrate Multi file program and user defined libraries.	02 Hrs.
Experiment No. 7: Write a program that accepts only single alphabetical characters. On encountering a non-alphabet it terminates after printing all the alphabets entered so far in sorted order.	02 Hrs.
Experiment No. 8: Write a program to check a C program for rudimentary syntax errors like unbalanced parentheses, brackets and braces, quotes, both single and double, escape sequences and comments.	02 Hrs.
Experiment No. 9: Write a complete well documented C program that accepts an integer from the command line and prints the prime factorization on screen and a file with filename as the input integer and extension as .txt.eg. If input number is 123, the file name should be 123.txt .For any invalid input, it should be able to print an error message and quit	02 Hrs.

Textbooks

1. The C Programming Language – 2nd edition - B.W.Kernighan and D.M.Ritchi (The McGraw Hill) - PHI
2. Programming in C - 2nd edition - B.Gottfried - Schaum Outline Series.

References:

1. C: The Complete Reference - 4th edition - Herbert Schidt - McGraw Hill.
2. Let Us C – 14th edition - Yashvant Kanetkar – BPB Publication.

Title of the Course: Principles of Electrical Engineering Laboratory		L	T	P	Credit									
Course Code: UCBES0132		-	-	2	1									
Course Pre-Requisites : Modern Physics, Electro-magnetism, Electrical Circuit Elements														
Course Description: The course is designed to provide students hands on experiment to build electrical circuits and verify their performance that is learnt in theory. This including experiment with DC & AC circuit and measurement of														
Course Learning Objectives:														
1. To impart the use of electrical Elements, sources, measuring devices and transducers related to electrical circuits experimentally. 2. To verify the network theorems for the electric circuit using hardware. 3. To enable experimental measurement of electrical quantities in DC and AC systems.														
Course Outcomes:														
CO	After the completion of the course the student should be able to		Bloom's Cognitive											
			Level	Descriptor										
CO1	Demonstrate the use of important electrical equipment.		II	Understand										
CO2	Verify DC circuit theorems through experiments.		III	Applying										
CO3	Verify performance features of R, L, and C in AC circuits.		III	Applying										
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1						1					
CO2	2	3		1					1					
CO3	1	2		1					1					

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Assessment	Marks
ISE	25
ESE	--

ISE are based on practical performed/ Journal Writing / Oral.

Course Contents:

Experiment No. 1: Familiarization of electrical Elements, sources, measuring devices and transducers related to electrical	02 Hrs.
Experiment No. 2: Determination of resistance temperature coefficient.	02 Hrs.
Experiment No. 3: Verification of Superposition Theorem.	02 Hrs.
Experiment No. 4: Write a C program to count the lines, words and characters in a given text.	02 Hrs.
Experiment No. 5: Verification of Norton Theorem.	02 Hrs.
Experiment No. 6: Verification of Maximum Power Transfer Theorem.	02 Hrs.
Experiment No. 7: Simulation of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$.	02 Hrs.
Experiment No. 8: Simulation of Time response of R-C circuit.	02 Hrs.
Experiment No. 9: Verification of relation in between voltage and current in three phase balanced	02 Hrs.
Experiment No. 10: Demonstration of measurement of electrical quantities in DC and AC systems	02 Hrs.

Textbooks:

3. Electrical Technology Volume-I – 1st edition - B. L. Theraja - S. Chand
4. Elements of Electrical Engineering - 10th edition - P. V. Prasad - Cengage Learning.

References:

4. Laboratory courses in Electrical Engineering - S G Tarnekar and - S. Chand.
5. Basic Electrical Engineering – 3rd edition - D.P. Kothari, I.J. Nagrath – TMH Publishing Co. Ltd., New .

Title of the Course: Physics for Computing Science Laboratory											L	T	P	Credit	
Course Code: UCBBS0133											-	-	2	1	
Course Pre-Requisites: Basics Physics															
Course Description: This course includes Experiments to verify the laws, study the optics phenomenon practically, observe and evaluate the data for calculation and conclusion															
Course Learning Objectives:															
1. To find the relation between electric and magnetic field. 2. To study phenomenon of light like interference, diffraction, polarization. 3. To understand properties of laser and optical fiber. 4. To study Rayleigh’s criteria and determine resolving power diffraction grating. 5. To demonstrate use of optical bench for various optics experiments. 6. To analyze and obtain various crystal parameters from the XRD pattern.															
Course Outcomes:															
CO	After the completion of the course the student should be able to										Bloom’s Cognitive				
											Level	Descriptor			
CO1	Demonstrate different phenomenon of light and their applications.										II	Understand			
CO2	Analyze motion of body under influence of gravity and applications of pendulum.										III	Applying			
CO3	Analyze properties of material using modern techniques.										III	Applying			
CO4	Demonstrate experimental set up and models applicable for engineering.										III	Remember			
CO-PO Mapping:															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2													
CO2	3	2													
CO3	3	2		1											
CO4	3	2		2				2	3	3		1			

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Assessment	Marks
ISE	25
ESE	--

ISE are based on Group Discussion/Seminar/ Phet / Tinker CAD Activity

ESE: Assessment is based on

Course Contents:

Experiment No. 1: Katers' Pendulum	02 Hrs.
Experiment No. 2: Torsional Pendulum.	02 Hrs.
Experiment No. 3: Inverse square Law in photometry.	02 Hrs.
Experiment No. 4: Divergence of LASER	02 Hrs.
Experiment No. 5: Diffraction Grating.	02 Hrs.
Experiment No. 6: Resolving Power of Diffraction Grating.	02 Hrs.
Experiment No. 7: Study of crystal structure and Miller Indices.	02 Hrs.
Experiment No. 8: Determination of Hall coefficient of semi-conductor.	02 Hrs.
Experiment No. 9: Determination of Plank constant	02 Hrs.
Experiment No. 10: Determination of laser and optical fiber parameters	02 Hrs.
Experiment No. 11: Magnetic field along the axis of current carrying coil – Stewart and Gee	02 Hrs.
Experiment No. 12: Determination of specific rotation of sugar solution using polarimeter	02 Hrs.
Experiment No. 13: Determination of Stefan's Constant	02 Hrs.

Textbooks:

An Advance course in Practical Physics – 8th edition - B D. Chattopadhaya & P.C. Rakshit - New central Book Agency

References:

Experiments in Engineering Physics – 1st edition - Avadhanalu, Dhani & Pokley - S. Chand.

Principles and Practice of Analytical Chemistry – 5th edition - F.W. Fifield, D. Kealey – Blackwell Science Ltd.

Title of the Course: Business Communication & Value Science - I Laboratory		L	T	P	Credit									
Course Code: UCBHS0134		-	-	2	1									
Course Pre-Requisites : Business Communication and Value Science-I Theory														
Course Description: This is a practice-oriented course, laying importance on application of various skills being learnt in the Business Communication and Value Science-I course.														
Course Learning Objectives:														
1. To acquaint students with English phonology and make them practice correct pronunciation . 2. To provide them ample practice for developing their listening and speaking skills. 3. To strengthen their grammatical competence through practice. 4. To provide them platform to experience life skills														
Course Outcomes:														
CO	After the completion of the course the student should be able to		Bloom’s Cognitive											
			Level	Descriptor										
CO1	Comprehend English Sounds, stress patterns and intonation and English grammar to perform better professionally (U).		IV	Analyze										
CO2	Use listening comprehension techniques in day today life (AP) .		III	Apply										
CO3	Construct effective public speeches (CR).		III	Apply										
CO4	Use life skills in real life situations (AP) .		III	Apply										
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					1			1	1	1		1		
CO2					1			-	1	3		2		
CO3								1	2	3		-		
CO4								1	2	3		1		

Assessments :**Teacher Assessment:**

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	25
ESE	25

ISE are based on practical performance/ Quiz/ Presentation/Group Discussion/Role plays/Assignments/Demonstration, etc

ESE: Assessment is based on

Distribution of Marks:

- Lab Activities
- Lab Tests and Practical Performance
- Public Speech (extempore and prepared)
- Attendance

Course Contents:

Experiment No. 1: Ice breaking: Introducing self and others Adjectives, phrases and clauses to describe oneself and others Introducing oneself and others-demonstration	02 Hrs.
Experiment No. 2: Recognize the need for life skills and values Presentation on favorite cricket captain in IPL/any sports and the skills and values they demonstrate .	02 Hrs.
Experiment No. 3: Phonetics Introduction to Phonetics-Consonants, Vowels and Diphthongs in English with videos samples, Stress, tone and intonation, pronunciation practice with audio video samples.	02 Hrs.
Experiment No. 4: Verbal Aptitude -1 Vocabulary building games, practicing affixation, confusable, homonyms, homophones, using idioms, newspaper reading	02 Hrs.
Experiment No. 5: Verbal Aptitude -2 Using proper tenses, correct use of articles, conjunctions and prepositions Types of sentences and conversion, active and passive voice, spotting errors in sentences with justification, word order, punctuation marks Listening practice.	02 Hrs.
Experiment No. 6: Listening comprehension, Strategies for effective listening with audio/video samples.	02 Hrs.
Experiment No. 7: Speaking practice-1 Video samples of effective and ineffective public speeches, Extempore (JAM), prepared speeches practice-1.	02 Hrs.

Experiment No. 8: Speaking practice-2 Prepared speeches for ISE.	02 Hrs.
Experiment No. 9: Experiencing Life Skills Community service-work with an NGO and make share experience -Roleplay	02 Hrs.
Experiment No. 10: Understanding Life Skills: Movie based learning – Pursuit of Happiness. What are the skills and values you can identify, what can you relate to?	02 Hrs.
Textbooks:	
1. Orel Talk Digital Language Lab Software – Professional Version with 1+50 users subscription	
References:	
2. Better English Pronunciation – 2 nd edition - J.D. O'Connor - OUP. 3. A Practical Course in Spoken English – 1 st edition - J.K. Gangaj – PHI Learning Pvt. Ltd 4. English Language Laboratories - 2 nd edition - Nira Konar - PHI Learning.	

Title of the Course: Desktop Publishing Laboratory	L	T	P	Credit
Course Code: UCBVS0135	-	-	2	1

Course Pre-Requisites : Knowledge of Basic Computer Concepts

Course Description: The objective of the course is to provide the participants understanding of the techniques essential to build their career in desktop publishing using suitable hardware and software tools. This course offers a range of topics of immediate relevance to industry and makes the participants exactly suitable for DTP Industry.

Course Learning Objectives:

1. To create professional reports, documents and excel applications.
2. To create effective design templates using modern design tools.
3. To create logos, posters, design cards using modern design tools.

Course Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	Create professional quality reports, documents, and presentations and apply mathematical functions using Microsoft word, PowerPoint and excel applications.	VI	Create
CO2	Apply Photoshop as a premier graphic design and image editing tools.	III	Apply
CO3	Create Documents and Templates using page makers, add text into documents using various methods, and apply different formatting styles to characters and paragraphs.	VI	Create
CO4	Create Logos, various types of print designs, Design Pamphlets, Posters, Invitation cards, Greeting cards, Wrappers, Advertisements, Banners and Package using coral draw.	VI	Create

CO-PO Mapping:

[illegible]

Assessments:**Teacher Assessment:**

One component of In Semester Evaluation (ISE) having 100% Practical Oral Examination (POE)

Assessment	Marks
ISE	25
ESE	25

ISE are based on practical performance/ Quiz/ Presentation/Group Discussion/Role plays/Assignments/Demonstration, etc.

Course Contents:

Experiment No. 1: Fundamentals of Computers: (Understanding the functions, characteristics & basic components of a computer system, various peripherals, storage devices & understand their physical structure & working, Understand Login, Logout, file, directories & sub directories.	02 Hrs.
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Experiment No. 2: MS Office-Part-1: (Creation, edition, & printing a document/ page/ presentation/ excel sheet in MS Office, Incorporate & use advanced features in MS Word. Inserting word art, shapes, Clipart, Charts, Smart arts, symbols, Graphs etc. in a document/slide. Calculations using various formulas, Function in Excel, Representing data as chart in MS Word, Excel & PowerPoint)	02 Hrs.
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Experiment No. 3: (Design presentations using text, graphics, images, tables and charts. Design presentations with advance features using animations & objects. Importing & exporting excel sheets to/from various formats, Adding Headers/Footers & use macros.)	02 Hrs.
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Experiment No. 4: Photoshop Part-1: Getting Acquainted with Photoshop, Basic Image Manipulation, Color Basics, Painting Tools, Brush Settings, Making Selections	02 Hrs.
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Experiment No. 5: Photoshop Part-2: Filling and stroking, Layers, Advanced Layers, Text drawing Using Channels and Masking, Manipulating images, Getting to know the work area, Using Adobe Bridge	02 Hrs.
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Experiment No. 6: Photoshop Part-3: Basic Photo Corrections, Retouching and Repairing, Working with selections, Layer Basics, Masks and channels, Correcting and enhancing digital photographs, Topographic design	02 Hrs.
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Experiment No. 7: Introduction to Page Maker-Introduction to various versions, concepts and applications of PageMaker	02 Hrs.
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Experiment No. 8: PageMaker Part-2: Getting Started with PageMaker, PageMaker Interface, Creating a New Document, Managing Document Layer, Creating & Editing Text, Working with Edit Story	02 Hrs.
Experiment No. 9: Coral Draw Part-1: Getting started with Corel Draw, Introduction to Corel Draw, Features of Corel Draw, Corel Draw Interface, Tool Box, Moving from Adobe Illustrator to Corel Draw, Common Tasks	02 Hrs.
Experiment No. 10: Drawing and Coloring, Selecting Objects, Creating Basic Shapes, Reshaping Objects, Organizing objects, Applying color fills and Outlines	02 Hrs.
Experiment No. 11: Project work: Design Process, Designing Aids, Printing and presentation	02 Hrs.
Textbooks:	
1. Bittu Kumar (2013). Desktop Publishing: Practical Guide To Publish Anything On Your Desktop. V&S Publishers 2. Satish Jain, M. Geetha (2018). CorelDRAW Training Guide. BPB	
References:	
1. Simon Mitchell (1999). Mastering Desktop Publishing. Palgrave Macmillan.	

Teaching and Evaluation Scheme for First Year Semester-II

Sr. No.	Course Code	Cluster	Course	Teaching Scheme				Evaluation Scheme			
				L	T	P	Credits	Components	Max	Min Marks for Passing	
1	UCBPC0201	PC	Data Structures and Algorithms	3	0	0	3	ISE-I	10		40
								ISE-II	10		
								MSE	30		
								ESE	50	20	
2	UCBES0202	ES	Principles of Electronics	2	0	0	2	ISE-I	10		40
								ISE-II	10		
								MSE	30		
								ESE	50	20	
3	UCBBS0203	BS	Linear Algebra	3	0	0	3	ISE-I	10		40
								ISE-II	10		
								MSE	30		
								ESE	50	20	
4	UCBBS0204	BS	Statistical Methods	3	0	0	3	ISE-I	10		40
								ISE-II	10		
								MSE	30		
								ESE	50	20	
5	UCBEM0205	EM	Fundamentals of Economics	2	0	0	2	ISE-I	10		40
								ISE-II	10		
								MSE	30		
								ESE	50	20	
6	UCBAE0206	AE	Business Communication & Value Science – II	1	0	0	1	ISE-I	10		40
								ISE-II	10		
								MSE	30		
								ESE	50	20	
7	UCBIK0207	IK	Indian Environmental Studies	2	0	0	2	ISE	50	20	
8	UCBPC0231	PC	Data Structures and Algorithms Laboratory	0	0	2	1	ISE	25	10	
								ESE (POE)	25	10	
9	UCBES0232	ES	Principles of Electronics Laboratory	0	0	2	1	ISE	25	10	
10	UCBBS0233	BS	Statistical Methods Laboratory	0	0	2	1	ISE	25	10	
11	UCBAE0234	AE	Business Communication & Value Science – II Laboratory	0	0	2	1	ISE	25	10	
12	UCBVS0235	VS	Python Programming Laboratory	0	0	2	1	ISE	25	10	
			Total	16	0	10	21	Total	800		
	Total Contact Hours=26, Total Credits=21										

[illegible]

Assessments:											
Teacher Assessment: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.											
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ESE	50										
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Course Contents:											
Unit 1: Basic Terminologies and Introduction to Algorithm & Data Organization	7 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.											
Unit 2: Linear Data Structure	8 Hours										
Array, Stack, Queue, Linked list and its types, Various Representations, Operations & Applications of Linear Data Structures.											
Unit 3: Non-linear Data Structure	8 Hours										
Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree), Applications of Non-Linear Data Structures.											
Unit 4: Searching and Sorting on Various Data Structures	7 Hours										
Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heapsort, Introduction to Hashing.											
Unit 5: Files	7 Hours										
Organization (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.											

Unit 6: Graphs	8 Hours
Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	
Textbooks:	
1. E. Horowitz, S. Sahni, S. A-Freed (2008). Fundamentals of Data Structures. Universities Press. 2. A. V. Aho, J. E. Hopcroft, J. D. Ullman (1982). Data Structures and Algorithms. Pearson.	
References:	
1. Donald E. Knuth (1997). The Art of Computer Programming: Volume 1: Fundamental Algorithms. Addison-Wesley 2. Thomas, H. Cormen, Charles E. Leiserson, R L. Rivest, Clifford Stein (2009). Introduction to Algorithms. PHI Learning Pvt. Ltd. 3. Pat Morin (2013). Open Data Structures: An Introduction (Open Paths to Enriched Learning). UBC Press.	

[illegible]

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Course Contents:											
Unit 1: Introductory idea of semiconductors:	03 Hrs.										
Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone. Formation of PNP / NPN junctions, energy band diagram.											
Unit 2:Diodes and Diode Circuits	6 Hours										
V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.											
Unit 3:Bipolar Junction Transistors	6 Hours										
Transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode											
Unit 4: Field Effect Transistors	4 Hours										
Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles.											

Unit 5 :Operational amplifier basics	7 Hours
Introduction to integrated circuits, operational amplifier and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Proportional, Integral, Derivative circuits.	
Unit 6: Basic ideas of Digital electronics	5 Hours
Basic idea of switching circuit, Realization of Logic gates, multiplexers and demultiplexers, Flip flop, Registers and Counters.	
Textbooks:	
1. Electronic Devices and Circuits – 8th edition 2005 - R. Boylestad & L. Nashelsky and - PHI 2. Electronic Devices and Circuits – Allen Mottershed and - PHI 3. Fundamentals of Digital Circuits – Anand Kumar and - PHI	
References:	
1. Electronic Devices and Circuits – 4th edition - David A. Bell and - PHI 2. Electronic Devices and Circuits – 2th edition - Willim I. Fletcher and - PHI/ Pearson	

Title of the Course: Linear Algebra											L	T	P	Credit
Course Code: UCBBS0203											3	-	-	3
Course Pre-Requisite: Basic concepts of linear equations, Basic Properties of algebraic operations, vector algebra, matrix algebra.														
Course Description: This course contains study of system of linear equations, Eigen values and Eigen vectors, Vector Spaces, Linear Transformation, Quadratic forms & Inner product spaces.														
Course Learning Objectives:														
1. To make the students equipped with the tools and techniques of linear algebra. 2. To develop the skills in students to understand the mathematical background in engineering problems. 3. To develop the skill in students to do programming using linear algebra techniques.														
Course Outcomes:														
CO	After the completion of the course the student should be able to										Bloom's Cognitive			
											Level	Descriptor		
CO1	Apply systems of linear equations to solve various engineering applications.										III	Applying		
CO2	Apply the concept of vector spaces and linear transformations in graphics designing.										III	Applying		
CO3	Apply the concepts SVD and PCA to solve engineering applications										III	Applying		
CO4	Apply inner product space, Gram schmidt orthonormalization and QR decomposition concepts in programming.										III	Applying		
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	-	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	1	-

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Assessment	Marks										
ISE-1	10										
MSE	30										
ISE-2	10										
ESE	50										
Course Contents:											
Unit 1: System of Linear Equations	7 Hours										
Rank of a Matrix, System of Linear Equations, Gauss Elimination, LU Decomposition method.											
Unit 2: Vector Space	7 Hours										
Vectors , n-Vectors , linear combination, Linear Dependence & Independence of vectors, Vector space, Subspace, Spanning Set, Basis & Dimension.											
Unit 3: Linear Transformations	8 Hours										
Linear Transformations, Matrix of Linear transformation, Range and Kernel, Non-singular linear transformation, Rank-Nullity Theorem, Orthogonal transformation.											
Unit 4: EigenValues and EigenVectors	8 Hours										
EigenValues and EigenVectors, Cayley-Hamilton theorem and its Applications, Diagonalization, Inverse and power of matrix by modal matrix.											
Unit 5: Quadratic Forms and Applications	8 Hours										
Quadratic forms, Symmetric Matrices, Reduction of Quadratic forms to canonical form, Definite & Semi- definite forms, Linear and Orthogonal transformation, Singular value decomposition (SVD) and Principal Component Analysis(PCA), Applications to Image Processing and Machine Learning.											
Unit 6: Inner Product Space	7 Hours										
Inner Product Space, Norm of a Vector, Orthogonality, Orthogonal Projection, Gram-Schmidt orthonormalization, QR decomposition.											

Textbooks:

1. Elementary Linear Algebra – Larson, Edwards, Falvo and - Houghton Mifflin
2. Introduction to linear algebra – Gilbert Strang and – Wellesley
3. Linear Algebra – Kenneth Hoffman, Ray Kunze and – Pearson

References:

1. Linear Algebra – Seymour and – McGraw Hill
2. Linear Algebra and its Applications – David C Lay and – Pearson
3. Linear Algebra – Kenneth M Hoffman and – Prentice Hall

Title of the Course: Statistical Methods	L	T	P	Credit
Course Code: UCBBS0204	3	-	-	3

Course Pre-Requisite: Basic statistics and Probability.

Course Description: In this course students will learn topics from Regression, Statistical Inference and Time Series.

Course Learning Objectives:

1. To explain the role of regression in business.
2. To impart knowledge on collection, analysis and presentation of data.
3. To analyze distributions and relationships of real-time data.
4. To apply estimation and testing methods to make inference and modeling techniques for decision making.

Course Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	Interpret several statistical methods for the given data to infer the relation among the given variables.	II	Understand
CO2	Analyze the right test statistic to test the hypothesis formulated from the given data.	IV	Analyze
CO3	Make use of the appropriate nonparametric hypothesis testing procedures based on inferences.	III	Apply
CO4	Develop the model for the given time series and estimate the required forecasting.	III	Apply

CO-PO Mapping:

[illegible]

Assessments:											
Teacher Assessment: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively. <table> <tr> <th>Assessment</th><th>Marks</th></tr> <tr> <td>ISE-1</td><td>10</td></tr> <tr> <td>MSE</td><td>30</td></tr> <tr> <td>ISE-2</td><td>10</td></tr> <tr> <td>ESE</td><td>50</td></tr> </table> ISE-1 and ISE-2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.		Assessment	Marks	ISE-1	10	MSE	30	ISE-2	10	ESE	50
Assessment	Marks										
ISE-1	10										
MSE	30										
ISE-2	10										
ESE	50										
Course Contents:											
Unit 1: Linear Statistical Models	8 Hours										
Correlation and Scatter diagram, Linear regression and Least squares method, Multiple regressions & multiple correlations, Rank correlation.											
Unit 2: Statistical Inference – I (Estimation)	7 Hours										
Point estimation, Criteria for good estimates (un-biasedness, consistency and sufficiency), Methods of estimation including maximum likelihood estimation.											
Unit 3: Statistical Inference – II (Test of Significance)	8 Hours										
Test of hypothesis, Sampling distribution of mean and standard error, Large sample tests: Test for an assumed mean and equality of two population means, Small sample tests: t-test for an assumed mean and equality of means of two populations, Paired t-test, Neyman Pearson lemma.											
Unit 4: Analysis of Variance	8 Hours										
Test for single variance by using Chi – square distribution, Test for two variance by using F-distribution, Analysis of variance (one way, two ways with as well as without interaction)											
Unit 5: Non-parametric Inference	8 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.											
Unit 6: Basics of Time Series Analysis & Forecasting	6 Hours										
Stationary ARIMA Models: Identification, Estimation and Forecasting											

Textbooks:

1. Probability and Statistics for Engineers – 4th edition - L.I.R. Miller, J.E.Freund and R. Johnson
2. Fundamentals of Statistics – Vol. I & II - Goon, M. Gupta and - World Press
3. The Analysis of Time Series: An Introduction – Chris Chatfield

References:

1. Introduction to Linear Regression Analysis – D.C. Montgomery & E.Peck A.M. Mood, F.A.
2. Introduction to the Theory of Statistics – Graybill & D.C. Boes
3. Applied Regression Analysis – N. Draper & H. Smith
4. Hands-on Programming with R – Garrett Grolemond
5. R for Everyone: Advanced Analytics and Graphics – Jared P. Lander

[illegible]

Assessments:											
Teacher Assessment: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively. <table> <tr> <th>Assessment</th><th>Marks</th></tr> <tr> <td>ISE-1</td><td>10</td></tr> <tr> <td>MSE</td><td>30</td></tr> <tr> <td>ISE-2</td><td>10</td></tr> <tr> <td>ESE</td><td>50</td></tr> </table> ISE-1 and ISE-2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.		Assessment	Marks	ISE-1	10	MSE	30	ISE-2	10	ESE	50
Assessment	Marks										
ISE-1	10										
MSE	30										
ISE-2	10										
ESE	50										
Course Contents:											
Unit 1: Microeconomics	4 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)											
Unit 2: Welfare Analysis	7 Hours										
Consumers' and Producers' Surplus - Price Ceilings and Price Floors; Consumer Behaviour - Axioms of Choice - Budget Constraints and Indifference Curves; Consumer's Equilibrium - Effects of a Price Change, Income and Substitution Effects -Derivation of a Demand Curve; Applications - Tax and Subsidies - Intertemporal Consumption - Suppliers' Income Effect.											
Unit 3: Theory of Production	4 Hours										
Production Function and Iso-quants - 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.											
Unit 4: Macroeconomics	5 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.											
Unit 5: Money	5 Hours										
Definitions; Demand for Money -Transitory and Speculative Demand; Supply of Money - Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets - IS, LM Model.											

Unit 6: Business Cycles and Stabilization	5 Hours
Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment.	
Textbooks:	
1. Microeconomics – 8th edition - Chris Chatfield - Pindyck, Robert S., and Daniel L. Rubinfeld and- Pearson 2. Microeconomics – 12th edition - Dornbusch, Fischer and- McGraw Hill. 3. Economics – 20th edition - P.A.Samuelson, W.D.Nordhaus and - McGraw Hill. 4. Microeconomics – 8th edition - M.L.Jingan and – Vrinda publications, New Delhi.	
References:	
1. Intermediate Microeconomics: A Modern Approach – 8th edition - Hal R, Varian - Springer India Pvt. Ltd. India. 2. Principles of Macroeconomics – 7th edition - N.Gregory Mankiw - Cengage India Pvt. Ltd.	

Title of the Course: Business Communication and Value Science-II											L	T	P	Credit																																																																											
Course Code: UCBAE0206											1	-	-	1																																																																											
Course Pre-Requisite: Basic Knowledge of English (verbal and written) Completion of all units from Semester 1 course: BCVS-I.																																																																																									
Course Description: The current course will definitely help the learners to increase their employability and foster various indispensable soft skills.																																																																																									
Course Learning Objectives:																																																																																									
1. To develop effective writing, reading, presentation and group discussion skills. 2. To help students identify personality traits and evolve as a better team player. 3. To introduce them to key concepts of morality, behaviour & beliefs and diversity & inclusion.																																																																																									
Course Outcomes:																																																																																									
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Assessments:											
Teacher Assessment: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.											
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MSE	30										
ISE-2	10										
ESE	50										
ISE-1 and ISE-2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.											
Course Contents:											
Unit 1: Enhancing Reading and Writing Skills	5 Hours										
Effective reading: Importance, types, overcoming common obstacles, tips and strategies Effective writing: Importance, paragraph writing techniques, journal/blog writing, Catherine Morris and Joanie McMahon's writing techniques.											
Unit 2: Employment Communication	5 Hours										
Covering letter and resume, Group discussion, Interviews											
Unit 3: Presentation skills	5 Hours										
Techniques of effective professional presentations, collaborative/team presentations											
Unit 4: Business Meetings	6 Hours										
Types of meetings, strategies of conducting meetings effectively, Documentation (notice, agenda, minutes)											
Unit 5: Life Skills/Soft Skills-1	5 Hours										
Developing personality Self esteem: Know thyself											
Unit 6: Life Skills/Soft Skills-2	4 Hours										
Emotional Intelligence, Leadership and Teamwork, Time management											

Textbooks:

1. Communication Skills - 2013 edition - Meenakshi Raman and Sangeeta Sharma and - Oxford University Press (OUP).
2. Business Communication – 2015 edition - S. Kalia and S. Agarwal and – Wiley.
3. An Introduction to Professional English and Soft Skills - 2012 edition - Das et al and Cambridge University Press.

References:

1. Guiding Souls: Dialogues on the purpose of Life- 2015 edition - Kalam A.A. Alred, G. J., - Prabhat Prakashan
2. Handbook of Technical Writing – 10th edition - Brusaw, C. T., & Oliu, W. E.- St. Martin's Press Sherman
3. Skimming and Scanning Techniques- 2014 edition- Barbara - Liberty University

Web References:**1.ETHICS FUNDAMENTALS AND APPROACHES TO ETHICS**

<https://www.eolss.net/Sample-Chapters/C14/E1-37-01-00.pdf>

2.A Framework for Making Ethical Decisions

<https://www.brown.edu/academics/science-and-technology-studies/framework-making-ethical-decisions>

3.Five Basic Approaches to Ethical Decision

http://faculty.winthrop.edu/meelerd/docs/rolos/5_Ethical_Approaches.pdf

Online Resources:

- 1.<https://youtu.be/CsaTslhSDI>
- 2.https://m.youtube.com/watch?feature=youtu.be&v=IIKvV8_T95M
- 3.<https://m.youtube.com/watch?feature=youtu.be&v=e80BbX05D7Y>
- 4.https://m.youtube.com/watch?v=dT_D68RJ5T8&feature=youtu.be
- 5.<https://m.youtube.com/watch?v=7sLLEdBgYYY&feature=youtu.be>

Title of the Course: Indian Environmental Studies										L	T	P	Credit	
Course Code: UCBIK0207										2	-	-	2	
Course Pre-Requisite: Students shall have knowledge of: Basic Science (Physics and Chemistry)														
Course Description: The objective of the course is imparting fundamental knowledge and awareness of Environmental Studies among students and importance of conservation of environment.														
Course Learning Objectives:														
At the end of the course students will be able to :														
1. Study scope and importance of natural resources, ecosystems, biodiversity for creating awareness and their conservation in multiple disciplines.														
2. Learn various types of pollution, their impacts and control measures for minimizing pollution and sustainable development.														
3. Understand social issues related to environment, environmental ethics and human rights towards environment.														
4. Study various laws and regulations related to environment and its applicability in society and industries.														
Course Outcomes:														
CO	After the completion of the course the student should be able to									Bloom's Cognitive				
										Level	Descriptor			
CO1	Summarize natural resources, importance of ecosystem and conservation of biodiversity with respect to multiple disciplines									2	Understanding			
CO2	Explain causes, effects, solutions for various pollution problems and its minimization strategies.									2	Understanding			
CO3	Interpret environmental ethics and their implementation for betterment of environment and human life.									2	Understanding			
CO4	Summarize the requirements of laws and regulations for environmental conservation and applicability of legislations in society and industries.									2	Understanding			
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							2							
CO2	3												3	
CO3								2						
CO4						2								

Assessments:					
Teacher Assessment: ISE: Assessment is based on 100% course content <table> <tr> <th>Assessment</th><th>Marks</th></tr> <tr> <td>ISE</td><td>50</td></tr> </table>		Assessment	Marks	ISE	50
Assessment	Marks				
ISE	50				
Course Contents:					
Unit 1: Nature of Environmental Studies	4 Hours				
Definition, scope and importance, Multidisciplinary nature of environmental studies, Need for public awareness.					
Unit 2: Natural Resources and Associated Problems	5 Hours				
a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy. f) Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individuals in conservation of natural resources.					
Unit 3: Ecosystems	4 Hours				
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem :- a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).					
Unit 4: Biodiversity and its conservation	4 Hours				
Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega- diversity nation, Western Ghat as a biodiversity region.					

Hot-spot 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	
Unit 5: Environmental Pollution	4 Hours
Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.	
Unit 6: Social Issues and the Environment	4 Hours
Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rainwater harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products.	
Unit 7: Environmental Protection	4 Hours
From Unsustainable to Sustainable development. Environmental Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Population Growth and Human Health, Human Rights.	
Textbooks:	
1. Environmental Studies by Dr. P.D.Raut (Shivaji University, Kolhapur)	
References:	
1. Miller T.G. Jr., Environmental Science. Wadsworth Publications Co.(TB). 2. Odum, E.P.1971, Fundamentals of Ecology, W.B. Saunders Co. USA,574p 3. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media (R)	
Unit wise Learning Outcomes:	
At the end of the course the students will be able to: UO 1: Describe scope and importance of environmental studies. UO 2: Describe types of natural resources, their use and conservation. UO 3: Explain structure and functions of ecosystem, their types and importance. UO 4: Discuss biodiversity, endangered species and methods of biodiversity conservation. UO 5: Explain causes, effects and solutions to pollution problems. UO 6: Discuss environmental ethics and various social issues related to environment. UO 7: Discuss laws and regulations for conservation of environment.	

Assessments:**Teacher Assessment:**

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE are based on assignment/declared test/quiz/seminar/Group Discussions etc.

ESE: Assessment is based on oral examination.

Course Contents:

Experiment No.1: Write a menu driven & modular program for database management of any Restaurant. Based on a customer's consumption of food items, the program should generate the bill.	02 Hours
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Experiment No.2: Design, develop and execute a program in C to input N integer numbers in ascending order into a single dimension array, and then to perform a binary search for a given key integer number and report success or failure in the form of a suitable message.	02 Hours
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Experiment No.3: Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX). 1. Push an Element on to Stack 2. Pop an Element from Stack 3. Demonstrate how Stack can be used to check Palindrome 4. Demonstrate Overflow and Underflow situations on Stack 5. Display the status of Stack 6. Exit Support the program with appropriate functions for each of the above	02 Hours
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Experiment No.4: Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, %(Remainder), ^(Power) and alphanumeric operands.	02 Hours
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Experiment No.5: Design, Develop and Implement a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) 1. Insert an Element on to Circular QUEUE 2. Delete an Element from Circular QUEUE 3. Demonstrate Overflow and Underflow situations on Circular QUEUE 4. Display the status of Circular QUEUE 5. Exit Support the program with appropriate functions for each of the above operations	02 Hours
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Experiment No.6: Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Branch, Sem, PhNo 1. Create a SLL of N Students Data by using front insertion. 2. Display the status of SLL and count the number of nodes in it 3. Perform Insertion / Deletion at End of SLL 4. Perform Insertion / Deletion at Front of SLL(Demonstration of stack) 5. Exit	02 Hours
Experiment No.7: Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo 1. Create a DLL of N Employees Data by using end insertion. 2. Display the status of DLL and count the number of nodes in it 3. Perform Insertion and Deletion at End of DLL 4. Perform Insertion and Deletion at Front of DLL 5. Demonstrate how this DLL can be used as Double Ended Queue 6. Exit	02 Hours
Experiment No.8: Write a C program that implements Selection Sort algorithm to arrange the following list of integers in ascending order. 23, -2, 56, 1, 78, 8, 34, 23, 42, -31, 0	02 Hours
Experiment No.9: Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers. 1. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 2. Traverse the BST in In order, Preorder and Post Order 3. Search the BST for a given element (KEY) and report the appropriate message 4. Exit	02 Hours
Experiment No.10: Given a File of N employee records with a set K of Keys(4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table(HT) of m memory locations with L as the set of memory addresses (2-digit) of locations in HT. Let the keys in K and addresses in L are Integers. Design and develop a program in C that uses Hash function $H: K \rightarrow L$ as $H(K)=K \bmod m$ (remainder method), and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.	02 Hours
Experiment No.11: Write a C++ program that uses functions to perform the following: 1. Create a binary search tree of integers. 2. Traverse the above Binary search tree recursively in Preorder, In order, Post order.	02 Hours
Experiment No.12: Design, Develop and Implement a Program in C for the following operations on Graph(G) of Cities 1. Create a Graph of N cities using Adjacency Matrix. 2. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method.	02 Hours

Textbooks:

1. The C++ Programming Language -2005 edition- Bjarne Stroustrup and - Pearson Education
2. C++ and Object-Oriented Programming Paradigm -2004 edition- Debasish Jana and- PHI Learning Pvt. Ltd.

References:

1. Let us C++- -2019 edition - Yashavant Kanetkar - BPB publications.
2. A Complete Guide to Programming in C++ - 2001 edition- Peter Prinz and Ulla Prinz -Jones and Bartlett Publishers

Assessments:									
Teacher Assessment: ISE are based on practical performed/ Quiz/ Mini-Project assigned / Presentation/ Group Discussion/ Internal oral.									
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Course Contents:									
Experiment No.1: Study of V-I Characteristics of a PN junction diode.	02 Hours								
Experiment No.2: Study of Half Wave Rectifier.	02 Hours								
Experiment No.3: Study of Full Wave Rectifier.	02 Hours								
Experiment No.4: Study of transistor characteristics.	02 Hours								
Experiment No.5: Study of Oscillator.	02 Hours								
Experiment No.6: Study of Integrator and Differentiator using operational Amplifier	02 Hours								
Experiment No.7: Study of Basic Gates.	02 Hours								
Experiment No.8: Study of Half/Full Adder.	02 Hours								
Experiment No.9: Study of Multiplexers and Demultiplexers.	02 Hours								
Experiment No.10: Study of Shift Registers.	02 Hours								
Textbooks:									
1. Electronic Devices and Circuits -8 th edition 2005- R. Boylestad & L. Nashelsky and - Prentice Hall 2. Electronic devices & circuits - Allen Mottershed and- PHI 3. Fundamentals of Digital Circuits- Anand Kumar and- PHI									
References:									
1. Electronic devices & circuits – IV edition- David A. Bell - Prentice- Hall India 2. Electronic devices & circuits - II edition- Millman & C.Halkias - Tata McGraw Hill Publication 3. An Engineering Approach to Digital Design - Willim I. Fletcher - PHI/ Pearson									

Title of the Course: Statistical Methods Laboratory	L	T	P	Credit
Course Code: UCBBS0233	-	-	02	01

Course Pre-Requisite: Basic understanding of programming.

Course Description: The course is designed to provide application of R statistical language on real life data set to the students.

Course Learning Objectives:

1. Understand R programming language for analysis of data.
2. Perform operations on real life data sets using R Programming language.
3. Solve the ANOVA problems by using R Programming language.

Course Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	Demonstrate use of R Programming Language	III	Apply
CO2	Make Use of R Programming Language to apply statistical methods to the given data.	III	Apply
CO3	Solve the Parametric and Non parametric test using R Programming Language	III	Apply
CO4	Examine the ANOVA performance.	IV	Analyze

CO-PO Mapping:

[illegible]

Assessments:									
Teacher Assessment: ISE are based on practical performed/ Quiz/ Mini-Project assigned / Presentation/ Group Discussion/ Internal oral.									
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Course Contents:									
Experiment No.1: Introduction to R software: Understanding Data types; importing/exporting data.	02 Hours								
Experiment No.2: Representation of data: Computing Summary Statistics /plotting and visualizing data using Tabulation and Graphical Representations.	02 Hours								
Experiment No.3: Applying correlation and simple linear regression model to real dataset; computing and interpreting the coefficient of determination.	02 Hours								
Experiment No.4: Applying multiple linear regression models to real dataset; computing and interpreting the multiple coefficients of determination.	02 Hours								
Experiment No.5: Testing of hypothesis for One sample mean and proportion from real-time .	02 Hours								
Experiment No.6: Testing of hypothesis for Two sample mean and proportion from real-time.	02 Hours								
Experiment No.7: Performing ANOVA for real dataset for Randomized Block design.	02 Hours								
Experiment No.8: Latin square Design.	02 Hours								
Experiment No.9: Non parametric Sign test and Wilcoxon signed rank test.	02 Hours								
Experiment No.10: Non parametric Mann-Whitney test.	02 Hours								
Textbooks:									
1. R- Software – Professional Version with 1+25 users subscription									
References:									
1. Hands-on Programming with R - Garrett Grolemond 2. R for Everyone: Advanced Analytics and Graphics- Jared P. Lander 3. Data Source: www.rbi.org.in									

Title of the Course: Business Communication and Value Science-II Lab										L	T	P	Credit																																																																											
Course Code: UCBAE0234										-	-	02	01																																																																											
Course Pre-Requisite: Business Communication and Value Science-II Theory																																																																																								
Course Description: This practice and application-oriented course provides ample scope for practicing essential employment skills, such as group discussion and interview, and strengthening learners’ interpersonal skills. It also focuses on various business communication forms such as meetings and professional presentations. With this course, the learners will understand the core communication areas in business/professional context, grasp them and start increasing their employability by cultivating them through practice.																																																																																								
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1. To motivate the learners to take part in various spoken and team activities Enhance their GDPI skills. 2. To develop professionalism in them. 3. Acquire technical writing skills.																																																																																								
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Assessments:															
Teacher Assessment: ISE: ISE is based on practical performance/ Quiz/ Presentation/ Group Discussion/Role plays/Assignments/Demonstration, etc.															
<table border="1"> <thead> <tr> <th>Assessment</th><th>Marks</th></tr> </thead> <tbody> <tr> <td>Practical performance</td><td>10</td></tr> <tr> <td>Group Discussion</td><td>10</td></tr> <tr> <td>Team Activities</td><td>10</td></tr> <tr> <td>Presentation</td><td>10</td></tr> <tr> <td>Attendance</td><td>10</td></tr> <tr> <td>Total</td><td>50</td></tr> </tbody> </table>		Assessment	Marks	Practical performance	10	Group Discussion	10	Team Activities	10	Presentation	10	Attendance	10	Total	50
Assessment	Marks														
Practical performance	10														
Group Discussion	10														
Team Activities	10														
Presentation	10														
Attendance	10														
Total	50														
Course Contents:															
Experiment No.1: Group Discussion-Beginners Group discussion tips, Do's and Don'ts, video samples Mock GD-1, analysis and comments on individual performances	02 Hours														
Experiment No.2: Group Discussion-Masters Mock GD-2, evaluation, progress check and suggestions - ISE	02 Hours														
Experiment No.3: Mock Interview- Beginners Discussing interview FAQs in detail, video samples Mock interviews.	02 Hours														
Experiment No.4: Mock Interview- Masters Mock interviews (prepared and formal)-ISE.	02 Hours														
Experiment No.5: Forming an NGO Each group will form an NGO. Create Vision, Mission, Value statement, tagline and design a logo.	02 Hours														
Experiment No.6: Presentation Skills-1 Teams to present their NGOs. Apply the learning gathered from the course. Presentation to be recorded by the groups. feedback from the audience/ faculty.	02 Hours														
Experiment No.7: Presentation Skills-2 Team presentations on social issues and values using ICT tools.	02 Hours														
Experiment No.8: Business meetings Drafting documentations for a business meeting, mock meetings on business related issues.	02 Hours														
Experiment No.9: Business Proposals Forming teams, preparing and presenting business proposals (teamwork).	02 Hours														
Experiment No.10: Movie session: Any good movie based on Life Skills and Values.	02 Hours														
Important note: All the practical sessions will focus on developing various interpersonal/life skills.															

Textbooks:

1. Orell Talk Digital Language Lab Software – Professional Version with 1+50 users subscription.

References:

1. Better English Pronunciation -2nd edition- J.D. O'Connor and – OUP
2. A Practical Course in Spoken English – 1st edition- J.K. Gangaj - PHI Learning Pvt. Ltd.
3. English Language Laboratories – 2nd edition- Nira Konar - PHI Learning

Title of the Course: Python Programming Laboratory										L	T	P	Credit	
Course Code: UCBVS0235										0	0	2	1	
Course Pre-Requisite: Fundamentals of Computer Science														
Course Description: Understand python Language e.g. syntax, variables & operators.														
Course Learning Objectives:														
1. Understand python program to demonstrate the use of core syntax, variables & operators.														
2. Perform Operations on data structure using python														
3. Solve the problems by implementing the functions and demonstrate the operations on file system														
Course Outcomes:														
CO	After the completion of the course the student should be able to									Bloom's Cognitive				
										Level	Descriptor			
CO1	Understand python programs to demonstrate the use of core syntax, variables & operators.									03	Apply			
CO2	Perform Operations on data structure using python									03	Apply			
CO3	Solve the problems by implementing the functions and demonstrate the operations on file system									03	Apply			
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2			2								2	2
CO2	2	2	2		3								3	2
CO3		3	2		3								2	2

Assessments:**Teacher Assessment:**

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	25
ESE	--

ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc. ESE: Assessment is based on oral examination

Course Contents:**Experiment No. 1: Implement Assignment on Variables, Operators and Expressions**

- i. Write a program that asks the user for his name and then welcomes him. The output should look like this.
- ii. Write a program that prompts the user to enter two integers and display their sum on the screen.
- iii. Write a program that prompts the user to input a Celsius temperature and outputs the equivalent temperature in Fahrenheit. The formula to convert the temperature is: $F = 9/5 C + 32$ where F is the Fahrenheit temperature and C is the Celsius temperature.
- iv. Write a program which accepts principle, rate and time from the user and print the simple interest. The formula to calculate simple interest is: $\text{simple interest} = \text{principal} \times \text{rate} \times \text{time} / 100$ Solution
- v. Write a program that accepts seconds from the keyboard as integers. Your program should convert seconds in hours, minutes and seconds.
- vi. Write a program that prompts the user to enter a number in two variables and swap the contents of the variables.
- vii. Write a program that prompts the user to enter a number in two variables and swap the contents of the variables. (Do not declare extra variables.
- viii. Write a program that prompts the user to input the radius of a circle and outputs the area and circumference of the circle. The formula is

$$\text{Area} = \pi \times \text{radius}^2$$

$$\text{Circumference} = 2 \times \pi \times \text{radius}$$
- ix. Write a program which prompts the user to input principle, rate and time and calculate compound interest. The formula is:

$$CI = P(1+R/100)^T$$

02 Hrs.**Experiment No. 2: Implement Assignment on Conditional Structures in Python**

- i. Write a program that prompts the user to input a number and display if the number is even or odd.

04 Hrs.

ii. Write a Python program that takes an age as input and determines whether a person is eligible to vote. If the age is 18 or above, print "You are eligible to vote." Otherwise, print "You are not eligible to vote yet." iii. Write a program that prompts the user to input two integers and outputs the largest. iv. Write a program that prompts the user to enter a number and determines whether it is positive, negative, or zero. The program should print "Positive" if the number is greater than 0, "Negative" if the number is less than 0, and "Zero" if the number is 0. v. Write a program that prompts the user to input a number from 1 to 7. The program should display the corresponding day for the given number. For example, if the user types 1, the output should be Sunday. If the user types 7, the output should be Saturday. If the number is not between 1 to 7 user should get error message as shown in sample output. vi. Write a program that prompts the user to input a year and determine whether the year is a leap year or not. Leap Years are any year that can be evenly divided by 4. A year that is evenly divisible by 100 is a leap year only if it is also evenly divisible by 400.	
Experiment No. 3: Implement Assignment on Looping Structures in Python i. Write a Python program to print the numbers from 1 to 10 using a for loop. ii. Write a program to print even numbers from 1 to 10. iii. Write a program that prompts the user to enter a number n and prints all the numbers from 1 to n. iv. Write a program that prompts the user to enter a number n, and then prints all the odd numbers between 1 and n. v. Write a Python program to print the first 8 terms of an arithmetic progression starting with 3 and having a common difference of 4 vi. Write a Python program that prompts the user to enter a positive integer. Your program should display all the factors of the number. Additionally, calculate and display the sum of its factors. Sample output: Enter a positive integer: 45 Factors: 1 3 5 9 15 45 Sum of factors: 78 vii. Write a program that prompts the user to input a decimal integer and display its binary equivalent. viii. Write programs to print given patterns.	02 Hrs.
Experiment No. 4: Implement Assignment on String Operations and Functions in Python i. Write a program that accepts a string from user. Your program should count and display number of vowels in that string. ii. Write a Python program that accepts a string from user. Your program should create and display a new string where the first and last characters have been exchanged. iii. Write a Python program that accepts a string from user. Your program should create a new string in reverse of first string and display it.	02 Hrs.

iv. Write a program that asks the user to input his name and print its initials. Assuming that the user always types first name, middle name and last name and does not include any unnecessary spaces. a. For example, if the user enters Ajay Kumar Garg the program should display A. K. G. v. Write a program in python that accepts a string to setup a password. Your entered password must meet the following requirements: * The password must be at least eight characters long. * It must contain at least one uppercase letter. * It must contain at least one lowercase letter. * It must contain at least one numeric digit. a. Your program should perform this validation.	
Experiment No. 5: Implement Assignment on List in Python i. Write a program that accepts a list from the user and print the alternate element of the list. ii. Write a program that accepts a list from the user. Your program should reverse the content of the list and display it. Do not use the reverse () method. iii. Find and display the largest number of a list without using built-in function max(). Your program should ask the user to input values in the list from the keyboard. iv. Write a program with a function that accepts a string from the keyboard and creates a new string after converting the character of each word capitalized. For instance, if the sentence is "stop and smell the roses." the output should be "Stop and Smell The Roses"	02 Hrs.
Experiment No. 6: Implement Assignment on Dictionary in Python i. Write a program that reads a string from the keyboard and prints the unique words. Your program should convert input string to lowercase. ii. Write a program to print all elements in a list that have only a single occurrence. Example: if contents of list are [7, 5, 5, 1, 6, 7, 8, 7, 6]. iii. Your output should be: 1 8 iv. Write a program to read 6 numbers and create a dictionary having keys EVEN and ODD. Dictionary's value should be stored in a list. Your dictionary should be like: {'EVEN': [8,10,64], 'ODD':[1,5,9]}	02 Hrs.
Experiment No. 7: Implement Assignment on Functions in Python i. Write a function find_max that accepts three numbers as arguments and returns the largest number among three. Write another function main, in main () function accept three numbers from user and call find_max ii. Write a function, is a vowel that returns the value true if a given character is a vowel, and otherwise returns false. Write another function main, in main () function accept a string from the user and count the number of vowels in that string. iii. Write a function in python to find the sum of the cube of elements in a list. The list is received as an argument to the function, in turn, the function must return the sum. Write the main function which invokes the above function. iv. Write the definition of a function zero ending(scores) to add all those values in the list of scores, which are ending with zero and display the sum. a. For example: If the scores contain [200, 456, 300, 100, 234, 678] The sum should be displayed as 600.	04 Hrs.

Experiment No. 8: Implement Assignment on Recursion Function in Python - Write a recursive function that accepts an integer argument and returns the factorial. - Write a recursive function that accepts numbers and computes Fibonacci series. - Write a recursive function that calculates the sum of first n natural numbers.	02 Hrs.
Experiment No. 9: Implement Assignment on File Handling Concepts in Python - Write a program that writes 10 random numbers to a file 'numbers.txt'. Each random number should be in the range of 1 through 100. - Write a program that reads and displays all the numbers stored in the file numbers.txt (created in question 1) and calculates their total. - Write a function in python to read the content from a text file "poem.txt" line by line and display the same on screen. - Write a function in Python to count and display the total number of words in a text file.	02 Hrs.
Textbooks:	
1. “Core Python Programming” Second Edition, Dr. R. Nageswara Rao. 2. “Core Python Programming” Second Edition, Wesley J Chun.	
References:	
1. https://www.tutorialspoint.com/python/index.htm	
Swayam Courses:	