



VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS) :: BHIMAVARAM
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Course Structure for B. Tech. (With effect from 2019-2020)

VISION OF THE INSTITUTION

To ignite the minds of the students through academic excellence so as to bring about social transformation and prosperity.

MISSION OF THE INSTITUTION

1. To expand the frontiers of knowledge through Quality Education.
2. To provide valued added Research and Development.
3. To embody a spirit of excellence in Teaching, Creativity, Scholarship and Outreach.
4. To provide a platform for synergy of Academy, Industry and Community.
5. To inculcate high standards of Ethical and Professional Behavior.

VISION OF CSE DEPARTMENT

To build a strong teaching-learning base with a flair for innovation and research that responds to the dynamic needs of the software industry and the society.

MISSION OF CSE DEPARTMENT

1. To provide strong foundation both in theory and applications of Computer Science & Engineering, so as to solve real-world problems
2. To empower students with state-of-art knowledge and up to date technological skills, making them globally competent
3. To promote research, innovation and entrepreneurship with focus on industry and social outreach
4. To foster civic minded leadership with ethics and values among students

PROGRAM EDUCATIONAL OBJECTIVES OF CSE DEPARTMENT

1. Graduates will have knowledge of mathematics, science, engineering fundamentals, and in-depth studies in Computer Science Engineering, and will be able to apply them for formulating, analysing and solving real world problems.
2. Graduates will succeed in earning coveted entry level positions in leading Computer Software and Hardware Firms in India and abroad.
3. Graduates will succeed in the pursuit of advanced degrees and research in engineering or other fields and will have skills for continued, independent, lifelong learning and professional development throughout life.
4. Graduates will have good communication skills, leadership qualities, ethical values and will be able to work in teams with due attention to their social responsibilities.

PROGRAM OUTCOMES OF CSE DEPARTMENT

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.



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7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES OF CSE DEPARTMENT

- 1) An ability to demonstrate basic knowledge in databases, programming languages and algorithm analysis in the development of software applications.
- 2) An ability to design and develop projects using open source tools and efficient data structures.

III YEAR II SEMESTER							
S.No	Subjects	L	T	P	C	I	E
1	Computer Networks	3	-	-	3	40	60
2	Data Science & Visualization	3	1	-	4	40	60
3	Compiler Design	3	-	-	3	40	60
Professional Elective II							
4	1. Software Project Management	3	-	-	3	40	60
	2. Big Data Analytics						
	3. NoSql Databases						
	4. Multimedia and Animation						
Open Elective II (Inter Disciplinary Elective II)							
5	1. Digital Image Processing	3	-	-	3	40	60
	2. Green Building Technologies						
	3. Information Theory and Coding						
	4. Principles of Signal Processing						
	5. MAT LAB Programming and ML Tool Box						
6	CN Lab	-	-	3	1.5	40	60
7	Data Science Lab	-	-	3	1.5	40	60
8	Advanced English Communication Skills Lab	-	-	3	1.5	40	60
9	Socially Relevant Projects (15 hrs / semester)	-	-	1	0.5	20	30
10	Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions *	-	-	-	-	-	-
Total		15	1	10	21	340	510
						850	



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III B.Tech II SEMESTER

CSE

R19 SYLLABUS



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Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	3	0	0	3
Subject	Computer Networks				

COURSE OBJECTIVES:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research

UNIT – I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

UNIT – II:

Physical Layer – Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing, Wave Length Division Multiplexing.

UNIT – III:

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N A Protocol Using Selective Repeat.

UNIT – IV:

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation- Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha- Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols- Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet,



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UNIT – V:

Network Layer - The Network Layer Design Issues – Store and Forward Packet Switching- Services provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms- Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling- Load Shedding.

UNIT – VI:

Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp
Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

COURSE OUTCOMES:

1. Understand OSI and TCP/IP models
2. Analyze MAC layer protocols and LAN technologies
3. Design applications using internet protocols
4. Understand routing and congestion control algorithms
5. Understand how internet works

TEXT BOOKS:

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf,McGraw Hill Education

REFERENCE BOOKS:

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks - A Systems Approach” (5th ed), Morgan Kaufmann/ Elsevier, 2011

Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	3	0	0	3
Subject	Data Science & Visualization				

COURSE OBJECTIVES:

From the course the student will learn

- Provide you with the knowledge and expertise to become a proficient data scientist
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science.
- Learn to statistically analyze a dataset
- Explain the significance of exploratory data analysis (EDA) in data science
- Critically evaluate data visualizations based on their design and use for communicating stories from data

UNIT I

Introduction to Data Science, Getting Python, Whitespace Formatting, packages, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Object Oriented Programming, Iterators and Generators, Randomness, Regular Expressions, Functional Tools, zip and Argument Unpacking, args and kwargs, NumPy, pandas, scikit-learn packages.

UNIT II

Visualizing Data: what is data visualization, what to plot (univariate, bivariate and multivariate) matplotlib, Bar Charts, Line Charts, Scatterplots, heatmaps, distributions like histograms, bubble charts, Tree map.

EDA Process: Exploratory Vs Explanatory Analysis, handling missing values, removing duplicates, Outlier treatment, scaling, normalization, encoding categorical variables, Bivariate analysis.

UNIT III

Introduction and Descriptive Statistics: Introduction to statistics, Describing a Single Set of Data, Central Tendencies, Dispersion, Correlation, Simpson’s paradox, Other Correlational Caveats, causation,

Probability: Dependence and Independence, Conditional Probability, Bayes’s Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem.

UNIT IV

Gradient Descent: The Idea Behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Stochastic Gradient Descent.

Getting Data: stdin and stdout, Reading Files, Scraping the Web, Using APIs.

UNIT V

Machine Learning: Introduction to machine learning, training versus prediction, train - test split, cross validation, Overfitting and Underfitting, Correctness, The Bias-Variance Tradeoff, Feature Extraction and Selection, Measuring performance.

Algorithms: Simple Linear Regression, Multiple Regression, Logistic Regression, k-Nearest Neighbors, Naive Bayes ,clustering



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UNIT VI

Recommender Systems: Manual Curation, Recommending What's Popular, User-Based Collaborative Filtering, Item-Based Collaborative Filtering, Hybrid Recommendation systems, Matrix Factorization.

The art of storytelling in Data Science: The need of Storytelling, How to create stories, Types of data and suitable charts, Stories, During steps of predictive modeling, best practices.

COURSE OUTCOMES:

At the end of the course, student will be able to

- Apply required python skills required for data Science
- Get good idea of various techniques to visualize the data and perform basic EDA on data
- Apply different statistical and probability techniques required to understand the data
- Understand optimization methods like gradient descent
- Apply supervised and unsupervised learning algorithms for data science
- Understand recommender systems to understand user preferences and Ability to describe results.

TEXT BOOKS:

- 1) Joel Grus, "Data Science from Scratch", O'Reilly.
- 2) Allen B.Downey, "Think Stats", O'Reilly.

REFERENCES:

- 1) Doing Data Science: Straight Talk from The Frontline, 1 st Edition, Cathy O'Neil and Rachel Schutt, O'Reilly, 2013
- 2) Mining of Massive Datasets, 2 nd Edition, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, v2.1, Cambridge University Press, 2014
- 3) "The Art of Data Science", 1 st Edition, Roger D. Peng and Elizabeth matsui, Lean Publications, 2015
- 4) "Algorithms for Data Science", 1 st Edition, Steele, Brian, Chandler, John, Reddy, Swarna, springers Publications, 2016
- 5) <https://www.analyticsvidhya.com/blog/2020/05/art-storytelling-analytics-data-science/>
- 6) <https://www.analyticsvidhya.com/blog/2020/08/exploratory-data-analysiseda-from-scratch-in-python/>



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Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	3	0	0	3
Subject	Compiler Design				

OBJECTIVES:

Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

UNIT - I

Introduction Language Processing, Structure of a compiler, the evaluation of Programming language, Programming Language Basics.

Lexical Analysis-: The role of lexical analyzer, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT -II

Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down parsing bottom up parsing, Introduction to LL Parser & LR Parsers.

UNIT -III

More Powerful LR parser (LR1, LALR) Using Ambiguous Grammars Equal Recovery in LR parser Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

UNIT - IV

Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking, Back patching.

UNIT - V

Runtime Environments, Stack allocation of space, access to Non Local data on the stack Heap Management code generation - Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

UNIT -VI

Machine Independent Optimization. The principle sources of Optimization peep hole Optimization, Introduction to Data flow Analysis.



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OUTCOMES:

1. Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.
2. Parser and its types i.e. Top-down and Bottom-up parsers.
3. Construction of LL, SLR, CLR and LALR parse table.
4. Syntax directed translation, synthesized and inherited attributes.
5. Techniques for code optimization techniques and a simple code generator.

TEXT BOOKS:

1. Compilers, Principles Techniques and Tools. Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman, 2nd edition, Pearson, 2007
2. Compiler Design K.Muneeswaran, OXFORD
3. Principles of compiler design, 2nd edition, Nandhini Prasad, Elsevier.

REFERENCE BOOKS:

1. Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE
2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER

Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	3	0	0	3
Subject	Software Project Management				

COURSE OBJECTIVES:

At the end of the course, the student shall be able to:

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

UNIT I

Conventional Software Management: The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

UNIT II

The Old Way and The New: The principles of conventional software Engineering, Principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

UNIT III

Model Based Software Architectures: A Management perspective and technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows. Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.

UNIT IV

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT V

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics.

UNIT VI

Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique.



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Text Books:

- 1) Software Project Management, Walker Royce, Pearson Education, 2005.
- 2) Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.

Reference Books:

- 1) Software Project Management, Joel Henry, Pearson Education.
- 2) Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.
- 3) Effective Software Project Management, Robert K. Wysocki, Wiley, 2006.

Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	3	0	0	3
Subject	Information Theory and Coding				

Course Objectives:

- To define and apply the basic concepts of information theory (entropy, channel capacity etc.)
- To learn the principles and applications of information theory in communication systems
- To study various data compression methods and describe the most common such methods
- To understand the theoretical framework upon which error-control codes are built

UNIT I INFORMATION THEORY:

Discrete messages, Information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.

UNIT II SOURCE CODING:

Introduction, Shannon's theorem, Shannon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, Gaussian channel capacity, bandwidth –S/N trade off.

UNIT III: SOURCE CODING FOR TEXT, AUDIO, SPEECH AND IMAGE:

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I, II, III, Dolby AC3 Speech: Channel Vocoder, Linear Predictive Coding Image: Image formats, Image compression: READ, JPEG.

UNIT IV LINEAR BLOCK CODES:

Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes

UNIT V BINARY CYCLIC CODES:

Polynomial Representation of Codewords, Generator Polynomial, Systematic Codes, Generator Matrix, Syndrome Calculation and Error Detection, Decoding of Cyclic Codes.

UNIT VI CONVOLUTION CODES:

Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.



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Text Books:

1. T. M. Cover, J. A. Thomas, *Elements of Information Theory*, Wiley
2. Communication Systems, 3/e, by A.B. Carlson, Mc. Graw Hill Publishers
3. R. Togneri, C.J.S deSilva, *Fundamentals of Information Theory and Coding Design*, Taylor and Francis

Reference Books:

1. R. J. McEliece, *The Theory of Information and Coding*, Cambridge University Press
2. R. Bose, *Information Theory Coding and Cryptography*, Tata McGraw Hill

Course Outcomes:

At the end of the course, the students will be able to:

- Explain what is the significance of this quantitative measure of information in the communications systems
- Calculate entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system
- Differentiate between lossy and lossless compression techniques
- Compute and analyze Block codes, cyclic codes and convolution codes.
- Design a coded communication system.

Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	0	0	3	1.5
Subject	CN Lab				

COURSE OBJECTIVES:

- To Teach students practice orientation of networking concepts
 - To Understand the functionalities of various layers of OSI model
 - Apply different networking concepts for implementing network solution
-
1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
 2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP .
 3. Design TCP iterative Client and server application to reverse the given input sentence
 4. Design TCP client and server application to transfer file
 5. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call “select”
 6. Design a TCP concurrent server to echo given set of sentences using poll functions
 7. Design UDP Client and server application to reverse the given input sentence
 8. Design UDP Client server to transfer a file
 9. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.

Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	0	0	3	1.5
Subject	Data Science Lab				

Experiments:

1. a) Visualise the correlation between the features for the Rainfall prediction data set .
a) Find the outliers and visualise with any plot for the Housing Price dataset.

2. a) For a given dataset, find the measures of centre tendency for the chosen feature.
b) Display the confidence interval of a chosen feature based on a sample

3. Numpy Package
 - a) Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.

 - b) Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.

 - c) Computation on NumPy arrays using Universal Functions and Mathematical methods.

 - d) Import a CSV file and perform various Statistical and Comparison operations on rows/columns.

 - e) Load an image file and do crop and flip operation using NumPy Indexing.

4. Pandas package
 - a) Create Pandas Series and DataFrame from various inputs.

 - b) Import any CSV file to Pandas DataFrame and perform the following:
 - I. Visualize the first and last 10 records
 - II. Get the shape, index and column details
 - III. Select/Delete the records(rows)/columns based on conditions.
 - IV. Perform ranking and sorting operations.
 - V. Do required statistical operations on the given columns.
 - VI. Find the count and uniqueness of the given categorical values.
 - VII. Rename single/multiple columns.

5. Import any CSV file to Pandas DataFrame and perform the following:
 - (a) Handle missing data by detecting and dropping/ filling missing values.
 - (b) Transform data using apply() and map() method.
 - (c) Detect and filter outliers.
 - (d) Perform Vectorized String operations on Pandas Series.
 - (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

6. Create a database with the fields of weight, height and sex then create a plot of weight on the x-axis and height on the y-axis. Use different point characters or colors to distinguish between males and females and provide a matching legend. Label the axes and give the plot a title.
7. Create a plot for the same database consists of weight on the x-axis and height on the y-axis. Use different point characters or colors to distinguish between males and females and provide a matching legend. Label the axes and give the plot a title.
8. Write python code that will plot education on the x-axis and income on the y-axis, with both x- and y-axis limits fixed to be [0;100]. Provide appropriate axis labels. For jobs with a prestige value of less than or equal to 80, use a black * as the point character. For jobs with prestige greater than 80, use a blue @.
9. Choose any data like penguin dataset and visualise different plots like
 - a) Box plot
 - b) Histograms
 - c) Density plot
10. Exploratory Data Analysis on
 - a) Basic datasets like iris and titanic.
 - b) High dimensional dataset like house price prediction.
11. Creating Dashboards with
 - a) Plotly
 - b) Google Dashboard.
12. Create a Linear Regression model for a dataset and display the error measures
13. Choose a dataset with categorical data and apply linear regression model
14. Apply Naïve Bayes algorithm on a dataset and estimate the accuracy.
15. Classify the given text segment as 'Positive' or 'Negative' statement using the Naïve Bayes Classifier.
16. Apply Logistic Regression algorithm on a dataset and estimate the accuracy
17. Design a model to predict the housing price from Boston Dataset using Multivariate Linear Regression.
18. Implement the K-Means Clustering on any dataset like diabetic, car or buying behaviour of customers.
19. Extracting Data Using a Python Library
20. Extracting Data Using a Web Scraping



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Regulation Year	2019-20	0	0	3	1.5
Subject	Advanced English Communication Skills Lab				

UNIT-I: Vocabulary Building

UNIT-II: Reading comprehension

UNIT-III: Resume writing

UNIT-IV: Presentations

UNIT-V: Group Discussion

UNIT-VI: Interview skills

SUGGESTED SOFTWARE:

1. K-Van solutions Software with CD
2. Oxford advanced learner's compass, 7th Edition

SUGGESTED READING:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
3. English Vocabulary in Use Series, Cambridge University Press 2008.
4. Communication Skills by Leena Sen, PHI Learning Pvt. Ltd., New Delhi, 2009.
5. A Course Book of Advanced Communication Skills Lab published by University Press, Hyderabad.