CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS), HYDERABAD-75

Department of Computer Science and Engineering

Stake Holder Feedback For 2018-19

Professor and Head Department
Department of Computer Science & Engineering
Chaitanya Bharathi Institute of Technology (A)
Gandipet, Hyderabad-500 075.(T.S.)

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
(AUTONOMOUS), HYDERABAD-75

Stakeholders Feedback Analysis and Action Taken Report-(AY:2018-2019)

1. Students Feedback Analysis

Table 1: Responses related to Student Feedback (**No. of Responses: 61**)

S. No	Parameters	Avg Rating	%
1	Association-	3.82	76
2	Internships	1.88	39
3	Infrastructure-Common->Laboratory facilities	3.39	68
4	Infrastructure-Common->Computing facilities	3.52	71
5	Infrastructure-Common->Library facilities	3.67	73
6	Infrastructure-Common->Internet and Wi-Fi facilities	2.83	58
7	Infrastructure-Common->Games and Sports facilities	3.34	66
8	Infrastructure-Common->Admin. and Accounts Section Services	3.21	65

9	Infrastructure-Common->Academics & Examination Cell(AEC)	3.26	65
10	Infrastructure-Common->Controller of Examinations(CoE)	3.36	67
11	Infrastructure-Common->Transport facilities(if applicable)	3.24	65
12	Infrastructure-Common->Canteen facilities	3.11	62
13	Infrastructure-Common->Health Center facilities	3.18	64
14	Infrastructure-Common->Basic amenities including washrooms	2.45	50
15	Infrastructure-Common->Hostel facilities(if applicable)	2.93	58
16	Infrastructure-Common->Overall facilities	3.00	61
17	Placement and Training Cell->Training provided for placements.	2.70	56
18	Placement and Training Cell->Training and Placement Office provided on/off campus placement opportunities.	3.49	70
19	Placement and Training Cell->Career Counselling & Guidance for higher studies provided.	2.88	58
20	Placement and Training Cell->Co and Extra Curricular opportunities provided.	3.13	62
21	Placement and Training Cell->Motivation towards Research & Development(R&D)	3.01	60
22	Curriculum and Syllabus->	3.26	66
23	Suggestions-Curriculum Courses on Devops, Data Science		

Action Taken: Many students suggested to add new courses in the curriculum and New Courses like Virtual Reality, Nature Inspired Algorithms, Natural Language Processing, Case Study Lab courses were introduced in the syllabus.

2. Teachers Feedback Analysis

Table 3: Average Response of Faculty from all the departments (**No. of Responses: 21   **)

S. No	Parameters	Avg. Rating	%
1	The design of the curriculum addresses the holistic development of student.	4.56	91
2	The curriculum is well balanced with knowledge, skills and employability.	4.62	93
3	The syllabus suitable to the course.	4.56	91
4	The course/courses are relevant to the present scenario.	4.68	94
5	Course objectives and outcomes are well defined.	4.68	94
6	Prescribed books/suggested readings and other references appropriate.	4.68	94
7	BoS members from Academia and Industry constructive in updating the syllabi according to the changing educational challenges and requirements in line with regulating bodies like AICTE, UGC etc.	4.68	94
8	The scheme and evaluation schedules satisfy the Teaching Learning Process.	4.50	90
9	Freedom to suggest/propose/modify/incorporate new topics in the syllabus during the revision of curriculum?	4.69	94
10	Institute/Department gives the freedom to adopt new technologies/strategies of innovative teaching?	4.56	91
11	The environment in the department is conductive to learning, teaching, and research.	4.56	91

12	Provisions for professional development are non-discriminatory and fair.	4.50	90
13	Adequacy of infrastructure (class/staff rooms, labs, library, and ICT facilities) in the institute.	4.69	94

3. Parent Feedback Analysis

Table 4: Responses related to Theory Courses **(No. of Responses: 15   )**

S. No	Parameters	Avg. Rating
1	The Teaching-Learning Environment	4.14
2	Infrastructure Facilities (Laboratories and Class rooms)	3.50
3	Library, Internet, Computer, Wi-Fi etc.	3.50
4	Monitoring of Student's Progress	4.07
5	Participation by your wards in technical events (workshops and conferences).	4
6	Participation in personality development activities by your ward.	3.93
7	Response and communication with the college authorities.	3.50
8	Support Services like Bank and Post office	3.14
9	Canteen facility in the campus.	2.93
10	Student activity centres in the college (clubs and fests)	3.79
11	Facility for sports, games and transport facility for the students.	3.57
12	Training and placement activities in the campus.	4.14
13	Quality of Curriculum	4.07

Action Taken: Parents recommended to increase the importance on Core Subjects. Core Subjects were included in syllabus.

4.Employer Feedback Analysis

Table 5: Responses related to Theory Courses (**No. of Responses: 10)**

S. No	Parameters	Avg. Rating	%
1	Domain Knowledge and Aptitude Levels	1.7	84
2	Problem analysis and design of appropriate solutions	2	73
3	Attitude towards Research based approach	2	71
4	Adaptability to new technology/tools and zeal to be a constant learner	2.2	82
5	Commitment to work, managerial skills and ability to meet deadlines	2	80
6	Work towards sustainable development, Societal improvements and Environmental Benefits	1.3	78
7	Professional ethics	1.8	75
8	Communication Skills	2.1	65
9	Team spirit, interpersonal relations and leadership skills	1.5	60
10	How do you rate capability to analyze, synthesize, design, develop and test systems/processes	2	75
11	Overall Job performance	2	69

Action Taken: Employers recommended to include Cyber Security in the syllabus and students are encouraged to take up the NPTEL courses. Cyber Security courses are included in syllabus.

4. ALUMNI Feedback Analysis

Table 6: **Summary of Alumni Feedback Report** (No. of Responses: 15)

S. No	Parameters	Avg. Rating	%
1	Do you think our vision statement captures where we are heading as a Department to produce competent, skillful, social responsible, professionals who can contribute significantly to industry and research ?	2	67
2	Does our mission statements reflect our fundamental and unique purpose?	2	67
3	Whether the current statements of vision, mission and PEOs is as per current need.	1.75	58
4	Whether the department is moving towards right path as per vision & mission statements.	1.583 333	53

5	Do you want to suggest changes in Mission Statements?	No	
6	Do you want to suggest changes in PEOs Statements?	No	
7	Do you want to suggest changes in PSOs Statements?	No	
8	Do you think our vision statement captures where we are heading as a Department to produce competent, skillful, social responsible, professionals who can contribute significantly to industry and research ?	Yes	
9	Does our mission statements reflect our fundamental and unique purpose?	Yes	
10	Whether the current statements of vision, mission and PEOs is as per current need.	Yes	
11	Whether the department is moving towards right path as per vision & mission statements.	Yes	

Action Taken: Alumni recommended to include the courses on the Machine Learning, Artificial Intelligence, and Cyber Security. They also suggested students to take up the projects on the societal problems. Those courses are included in syllabus.

Chaitanya Bharathi Institute of Technology (Autonomous)
Gandipet, Hyderabad – 500075
Department of Computer Science and Engineering

Consolidated Action taken report on the Feedback obtained from Stake Holders
AY : 2018-2019

S.No	Suggestions from	Suggestions	Action Taken	Remarks
1	Student	Inclusion of Latest Technology related courses	Courses on new technologies like Virtual Reality, Nature Inspired Algorithms, Natural Language Processing are offered under R18 Curriculum	BOS 2019, Virtual Reality, Nature Inspired Algorithms, Natural Language Processing
2	Student	More Emphasize on Data Structures Course is required	Data Structure course is made mandatory for all the branches	BOS 2019, Basics of Data Structures
3	Student	Case studies to be included in Labs	Case study Lab is introduced in R18 Syllabus	BOS 2019, Case study Lab

4	Alumnus	Courses on Machine Learning, Cyber Security may be added	Machine Learning, Artificial Intelligence, Cyber Security are included in R18 Curriculum	[Machine Learning](), [Artificial Intelligence](), [Cyber Security]()
5	Faculty	Hands on sessions on latest technologies	Labs on latest technologies under Professional Elective like Mobile Application Development, Image Processing, Web And Internet Technologies, GUI Programming are offered in R18 Curriculum	[Mobile Application Development](), [Image Processing](), [Web and Internet Technologies](), [GUI Programming]()
6	Faculty	Course on NLP	Course on Natural Language Processing is offered in R18 Syllabus	[Natural Language Processing]()
7	Employer	MOOCs Learning suggested to introduce	Students are encouraged to take up NPTEL Certification courses	[MOOC's]()

8	Employer	Cyber Security awareness and industry related courses can be encouraged	Cyber Security course is introduced in VIII Sem and made available for other branches	Cyber Security, BOS 2019
9	Parent	More importance on Core Subjects	Core subjects of CSE are given importance in the curriculum	Syllabus R16, R18

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HOD, CSE Dept.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Department of Computer Science and Engineering

MINUTES OF BOS-MEETING

CSE Department BOS was conducted on **19-03-2019** at 10:30 AM in CBIT.

Agenda

1. To Confirm the minutes of BOS meeting held on 24/3/2018
2. Rectification of subject code for electives.
3. Finalization of 7th and 8th semester syllabus of CBCS.
4. Finalization of BE III- VIII semester schema and syllabus of Model Curriculum
5. M.Tech(CSE) scheme and syllabus under Model Curriculum
6. Any other item with the permission of chair.

The following members were present:

Sno	Name	Organization	Designation	
1	Dr. P Ravinder Reddy	Principal, CBIT	Member	Present
2	Prof. M Swamy Das	Head, CSE Dept., CBIT	Chairperson	Present
3	Dr. Sameen Fathima	Principal, OUCE	Nominee, OU	Present
4	Dr. P Shyamala	Head, CSE Dept., OUCE	University Expert	Present
5	Dr. Vineeth Balasubramanian	IIT Hyderabad	University Expert	Present
6	Mr. P Shaymsunder	MD, GGK Technologies	Member, Corporate	Present
7	M. V Kasireddy	Center Head, ThoughtWorks	Member, Industry	Absent
8	Mr. Praveen Ch	Tech Lead, Newsclick, Hyd	Member, Industry	Present
9	Dr. M A Wajeed	Professor, KMIT	Alumni	Present
10	Dr. Y Ramadevi	Professor, CSE Dept.	Member	Present
11	Dr. K Sagar	Professor, CSE Dept.	Member	Present
12	Dr. S Chniaramu	Professor, CSE Dept.	Member	Present
13	Prof. N Ramadevi	Professor, CSE Dept.	Member	Present
14	Mr. V Madhusudan Rao	Assoc. Professor, CSE Dept.	Member	Present
15	Dr. T.Sridevi	Assoc. Professor, CSE Dept.	Special Invitee	On Leave
16	Mr. G. Vivek	Asst. Professor, CSE Dept.	Member	Present

- The Chairperson welcomed the new BoS members and briefed about the Institute Vision, Mission and Department Vision and Mission.
- Department PEOs, PO, PSO were presented for any redefining.
- Members have confirmed with the existing PEOs, PO, PSO.

The Committee has resolved for following modifications

1. To confirm the minutes of BOS meeting held on 24/03/2018 Minutes of BOS meeting held on 24/03/2018 were confirmed.

2. Rectification of Elective code of 18CS E02 Python for Bioinformatics to 16CS O01, 18CS E02(Java Programming and Bio-Java) as 16CS O02. AI as AI & Expert Systems, Software Engineering as Software Engineering Principles and Practices

3. Finalization of 7th and 8th semester syllabus of CBCS.
   a. Information Security and Gender sensitization to be studied as mandatory course.
   b. NPTEL courses to be included as professional electives in VII and VIII semesters.

4. Finalization of BE III- VIII semester schema and syllabus of Model
   a. Data Structures to be included as Professional core for CSE students.
   b. Information security and Gender sensitization to be studied as mandatory course.

5. M.Tech(CSE) Scheme and Syllabus.
   a. Advanced Algorithms, Advanced Operating Systems and Advanced Databases & OOSE to be included as core.

6. Any other item with the permission of chair.
   a. Service course syllabus for Principles of Artificial Intelligence (ECE, Mech), Machine Learning using Python (ECE), Principles of DBMS(ECE), Virtual Reality(ECE), Cyber Security(ECE), IOT and Applications (Bio-Tech) Data Science using R (Bio Tech) was accepted.
   b. Python for Bioinformatics, JAVA Programming and Bio-Java offered in CBCS will be offered in Model curriculum.
   c. Virtual Labs to be encouraged.
   d. Encourage students for NPTEL / any other certification courses.
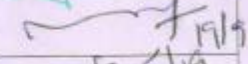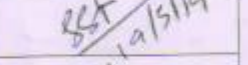   e. Case studies to be included / encouraged in labs.

Chairperson,   19/3/2019
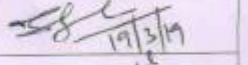BOS, CSE
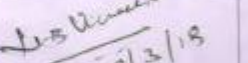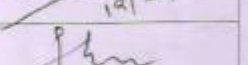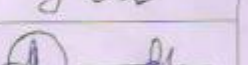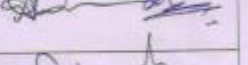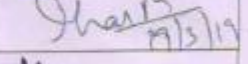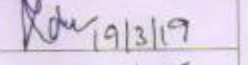
CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Department of Computer Science and Engineering

MINUTES OF BOS-MEETING

CSE Department BOS was conducted on 19-03-2019 at 10:00 AM in CBIT to finalize UG and PG scheme and syllabus.

The following members were present:

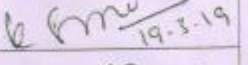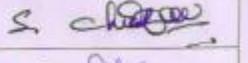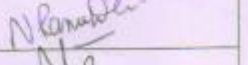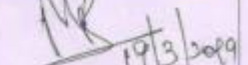| Sno	Name & Organization	Designation	Signature
1	Dr. P Ravinder Reddy, Principal, CBIT		
2	Prof. M Swamy Das, Head, CSE Dept., CBIT	Chairperson	
3	Dr. Sameen Fathima Professor, OUCE	Nominee from OU	
4	Dr. P Shyamala Head, CSE Dept., OUCE	External Expert	
5	Dr. Vineeth Balasubramanian IIT Hyderabad	External Expert	
6	Mr. P Shaymsunder MD, GGK Technologies	Member, Corporate	
7	Mr. Praveen Chandrahas Tech Lead, Newsclick, Hydy	Member from Industry	
8	Dr. M A Wajeed Professor, KMIT	Alumni	
9	Dr. Y Ramadevi Professor, CSE Dept.	Member	
10	Dr. K Sagar Professor, CSE Dept.	Member	
11	Dr. S Chinaramu Professor, CSE Dept.	Member	
12	Prof. N Ramadevi Professor, CSE Dept.	Member	
13	Mr. V Madhusudan Rao Associate Professor, CSE Dept.	Member	
14	Mr. G. Vivek Sr. Asst. Professor, CSE Dept.	Member	

<p align="center">**VIRTUAL REALITY**</p>

<p align="center">**(PROFESSIONAL ELECTIVE-V)**</p>

Instruction	3 Hours per week
Duration of End Examination Hours	3
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: The main objectives of this course are:

1. Provide detailed understanding of the concepts of Virtual Reality and applications
2. Understand geometric modeling and virtual environment
3. Prepare the students to develop Virtual Reality applications

Course Outcomes: On successful of the course student will be able to:

1. List the virtual environment requirements and benefits of virtual reality
2. Familiarize with various VR technologies and models of interactions in VR systems
3. Simulate flight dynamics of an aircraft in virtual environment
4. Identify the virtual hardware and software for modeling real world environments
5. Develop Virtual Reality applications
6. Explore the applications of VR in training, engineering, entertainment and science.

UNIT - I

Introduction to Virtual Reality- Introduction, Computer Graphics, real time computer graphics, flight simulation, virtual environment requirement, benefits of virtual reality, historical development of VR, scientific landmark. **3D Computer Graphics:** Introduction, virtual

world space, positioning the virtual observer, perspective projection, human vision, stereo perspective projection, 3D clipping, color theory, simple 3D modelling, illumination models, reflection models, shading algorithms, radiosity, Hidden surface removal, realism0stereographic image.

UNIT - II

Geometric Modeling: Introduction, 2d to 3D, 3D space curves, 3D boundary representation, **Geometric Transformations:** Introduction, frames of reference, modeling transformations, instances, picking, flying, scaling the VE, collision detection; **Generic VR system**: Introduction, virtual environment, computer environment, VR technology, Model of interaction, VR systems.

UNIT - III

Virtual Environment: Introduction, dynamics of numbers, linear and non-linear interpolation, animation of objects, linear and non-linear translation, shape and object in between, free from deformation, particle system, **Physical Simulation:** Introduction, objects falling in a gravitational field, rot rotating wheels, elastic collisions, projectivities, simple pendulum, springs and flight dynamics of an aircraft.

UNIT - IV

VR Hardware and Software: Human factors-eys, ear and somatic senses; **VR Hardware**: Introduction, sensor hardware, hed-coupled displays, acoustic hardware, integrated VR system; **VR Software:** Modeling virtual world, physical simulation, VR toolkits, introduction to VRML.

UNIT - V

VR Applications: Engineering, Entertainment, Science, Training, **Future:** Virtual environment, modes of interaction.

Text Books:
   1. John Vince, "Virtual Reality Systems", Pearson Education Asia, 2007

2. Anad R., "Augmented and Virtual Reality", Khanna Publishing House, Delhi

Suggested Reading:
1. Adams, "Visualization of Virtual Reality", Tata McGraw Hill, 2000
2. Grigore C. Burdea, Philippe Coiffet, "Virtual Reality Technology", Wiley Inter Science, 2nd Edition, 2006
3. William R Sherman, Alan B Craig, "Understanding Virtual Reality: Interface, Applications and Design", Morgan Kaufman, 2008

Online Resources:
1. www.vresources.org
2. www.vrac.iastate.edu
3. www.w3.org/MarkUp/VRM

NATURE INSPIRED ALGORITHMS

(PROFESSIONAL ELECTIVE-V)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Pre-requisites: Design and Analysis of Algorithms.

Course Objectives: The objectives of this course are

1. Understand the fundamentals of nature inspired techniques which influence computing

2. Study the Swarm Intelligence and Immuno computing techniques.

3. Familiarize the DNA Computing.

Course Outcomes: On Successful completion of this course, student will be able to 1. Identify the relation between computers (computing) and natural processes.

2. Describe concepts of Evolutionary Computing like Genetic Algorithms to solve engineering optimization problems.

3. Apply Swarm Intelligence like ACO and PSO to Travelling Salesman Problem.

4. Explain Danger theory and its role in various Immuno Computing Models.

5. Solve the SAT problem by using DNA manipulation functions and Filtering Models.

6. Familiarize with test tube programming.

UNIT - I

Introduction: From Nature to Nature Computing, Philosophy, Three Branches: A Brief Overview, Individuals, Entities and agents - Parallelism and Distributivity Interactivity ,Adaptation- Feedback-Self-Organization-Complexity, Emergence and ,Bottom-up Vs Top-Down- Determination, Chaos and Fractals.

UNIT - II

Computing Inspired by Nature: Evolutionary Computing, Hill Climbing and Simulated Annealing, Darwin's Dangerous Idea, Genetics Principles, Standard Evolutionary Algorithm -Genetic Algorithms, Reproduction-Crossover, Mutation, Evolutionary Programming, Genetic Programming.

UNIT - III

Swarm Intelligence: Introduction - Ant Colonies, Ant Foraging Behavior, Ant Colony Optimization, SACO and scope of ACO algorithms, Ant Colony Algorithm (ACA), Swarm Robotics, Foraging for food, Social Adaptation of Knowledge, Particle Swarm Optimization (PSO).

UNIT - IV

Immuno Computing: Introduction- Immune System, Physiology and main components, Pattern Recognition and Binding , Immune Network Theory- Danger Theory, Evaluation Interaction- Immune Algorithms , Introduction – Genetic algorithms, Bone Marrow Models, Forest's Algorithm**,** Artificial Immune Networks.

UNIT – V

Computing With New Natural Materials: DNA Computing: Motivation, DNA Molecule, Adleman's experiment, Test tube programming language, Universal DNA Computers, PAM Model, Splicing Systems, Lipton's Solution to SAT Problem, Scope of DNA Computing, From Classical to DNA Computing.

Text Books:
1. Leandro Nunes de Castro, " Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007

2. Floreano D. and Mattiussi C., "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies", MIT Press, Cambridge, MA, 2008

Suggested Reading:
1. Albert Y.Zomaya, "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006.
2. Marco Dorrigo, Thomas Stutzle, "Ant Colony Optimization", PHI,2005

Course Objectives: The objectives of this course are
1. To learn the fundamentals of natural language processing.
2. To understand the various Parsing techniques NLP.
3. To understand the role of semantics of sentences and pragmatics and apply the NLP techniques to IR applications.

Course Outcomes: On Successful completion of this course, student will be able to

1. Define the basic concepts of speech sound, phonetics, signals origins and applications of Natural Language processing.

2. Discuss about the language modeling techniques.

3. Identify the basic words, parsers and various levels in processing of natural language.

4. Explain the various semantics discourse and pragmatic levels of NLP.

5. Analyze Natural language Generation and apply machine translation.
6. Implement levels of NLP system using lexical resources to demonstrate Morphology of a language.

UNIT - I
Speech: Phonetics Speech Sounds and Phonetic Transcription. Articulator Phonetics Phonological categories and Pronunciation Variation Acoustic phonetics and signals. Automatic Speech Recognition Architecture. **Overview and Language Modeling:** OVERVIEW: Origins and challenges of NLP-Language and Grammar- Processing Indian Languages-NLP Applications-Information Retrieval.

UNIT - II
Language Modeling: Introduction-Various Grammar-based Language Models-Statistical Language Model. **Word Level Analysis**: Introduction Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. PARSING: Constituency Parsing-Probabilistic Parsing.

UNIT - III

Semantic Analysis: Introduction- Meaning Representation-Lexical Semantics Ambiguity-Word Sense Disambiguation. **Discourse Processing:** Introduction- cohesion-Reference Resolution Discourse Coherence and Structure.

UNIT - IV

Natural Language Generation and Machine Translation: Architecture of NLG Systems Generation Tasks and Representations-Application of NLG. Problems in Machine, Translation, Characteristics of Indian Languages- Machine Translation Approaches- Translation involving Indian Languages.

UNIT - V

Applications and Lexical Resources: Information Extraction, Automatic Text Categorization and Text Summarization, Question-Answering System.

Text Books:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition, 2008.

2. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

Suggested Reading:

1. James Allen, Bejamin/ cummings, "Natural Language Understanding", 2nd edition, 1995.

BASICS OF DATA STRUCTURES

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	2

Pre-requisites: Basic knowledge of programming language such as C or C++ is preferred (but not mandatory) and some mathematical maturity also will be expected.

Course Objectives:

1. To basic linear and non-linear data structures.

2. To analyzing the performance of operations on data structures.

3. To different sorting and searching techniques and their complexities.

Course Outcomes: After completion of this course, students will be able t Understand the basic concepts of data structures.

1. Understand the notations used to analyze the performance of algorithms.

2. Choose and apply an appropriate data structure for a specified application.

3. Understand the concepts of recursion and its applications in problem solving.

4. Demonstrate a thorough understanding of searching and sorting algorithms.

UNIT - I
Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time- space tradeoff. **Recursion**: Introduction, format of recursive functions, recursion Vs. Iteration, examples.

UNIT - II
Linked Lists: Introduction, Linked lists and types, Representation of linked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays.

UNIT - III
Stacks and Queues: Introduction to stacks, applications of stacks, implementation and comparison of stack implementations. Introduction to queues, applications of queues and implementations, Priority Queues and applications.

UNIT - IV
Trees: Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Representations of Trees, Tree Traversals, Binary search Tree.

UNIT - V
Graphs: Introduction, Applications of graphs, Graph representations, graph traversals, Minimal Spanning Trees.

Searching and Sorting: Linear searching, binary Searching, sorting algorithmsbubble sort, selection sort, quick sort, heap sort.

Text Books:

1. Narasimhaarumanchi, Data Structures and Algorithms Made Easy, CareerMonk Publications, 2017

2. S. Sahni and Susan Anderson-Freed, Fundamentals of Data structures in C,E.Horowitz, Universities Press, 2nd Edition.

3. ReemaThareja, Data Structures using C, Oxford University Press.

Suggested Reading:

1. D.S.Kushwaha and A.K.Misra, Data structures A Programming Approach with C, PHI.

2. Seymour Lipschutz, Data Structures with C, Schaums Outlines, Kindle Edition

<h1 style="text-align:center">CASE STUDY</h1>

Instruction	2 Hours per week
Duration of End Examination	2 Hours
Semester End Examination	35 Marks
Continuous Internal Evaluation	15 Marks
Credits	1

Case studies are common in engineering where we analyse (study) situations. Case study exercise is a realistic simulation of a real life situation or strategic problem we are likely to encounter in our workplace or surroundings. A case study is actually "analysing, applying engineering and science knowledge, reasoning and drawing conclusions" to solve a real situation. Case studies are different types including historical, real life, problem oriented etc.

Course Objectives: The objectives of this course are

1. To expose students to real life problems/events/situations and technologies

2. To promote individual study, critical thinking and group discussions to build team work 3. To inculcate the culture of self-learning, professional ethics communication

Course Outcomes: On successful completion of the case study, students will be able to

1. Understand real life situations, problems, developments of technologies in Computer science

2. Interpret, analyse, and think critically about the events, situations and gather information from various sources for formulating solutions

3. Apply learned knowledge and commit to decisions

4. Evaluate the approach and solution to the event/problem by considering efficiency and optimization

5. Communicate efficiently both in written and orally to discuss the recommendations

Suggestions to select case studies

- For a real situation case study, you can choose an event at your workplace to analyse.

- For a historical case study, you can take a recent collapse/development of a company /technology /project (Cambridge Analytica, Google, Facebook, AI, ML, IoT, GitHub, GNU, LibreOffice, FOSS etc.) and analyse what went wrong or gave raise.

- For a problem oriented case study, choose a problem where they need to (Situation-- Problem-Solution(s)-Evaluation):

- understand the situation faced (significance),

- analyse the specific problem to be tackled,

- create, analyse, and refine a solution and

- further evaluate, improve and implement **Instructions:**

- Students need to choose a case in consultation with any one of their class teachers and mentor

- The topic should be confined to the areas/courses of AI, SE, IoT,

- Submit an abstract consisting of the significance, objectives, methodology and work plan by the end of 3rd week

- Every week they need to show progress to the concerned teacher and mentor

- Shall present/demonstrate and submit a report(read the Case Study guide lines)

Assessment: The main focus of case studies are to assess the approach and the solution arrived. In fact, case studies are usually designed not to have one „correct" answer. As long as the students justify their recommendation, and stand up to interrogation from the assessor, they are likely to score marks. Students will be monitored by an internal teacher along with their mentors and evaluated by the external examiner at end.

MACHINE LEARNING

(PROFESSIONAL ELECTIVE

Instruction	3 Hours per week
Semester End Examination	3 Hours 70 Marks
CIE	30 Marks
Credits	3

Pre-requisites: Linear Algebra and Probability theory basics

Course Objectives: The objectives of this course are:

1. Understand the need and elements of Machine Learning
2. Study various machine learning techniques
3. Design solutions for real world problems using machine learning techniques

Course Outcomes: On successful of the course student will be able to:

1. Define the basic concepts related to Machine Learning.
2. Recognize the underlying mathematical relationships within and across Machine Learning algorithms and their paradigms.
3. Determine the various applications of Machine Learning.
4. Model the problems using various machine learning techniques.
5. Design and develop solutions to real world problems using Machine Learning Algorithms.
6. Evaluate and interpret the results of the various machine learning technique

UNIT - I
Introduction to Machine Learning: Introduction, Classic and Adaptive machines, learning types, deep learning, bio-inspired adaptive systems, Machine Learning and big data; **Elements of Machine Learning:** Data formats, Learnability, Statistical learning concepts, Class balancing, Elements of Information theory.

UNIT - II
Feature Selection and Feature Engineering: Data sets, Creating training and test sets, managing categorical data, missing features, data scaling and normalization, Withering, Feature selection and filtering, PCA, Visualization of high-dimensional datasets; **Regression Algorithms**: Linear models for regression, Regression types; **Linear Classification Algorithms:** Linear classification, logistic regression, grid search, classification metrics, ROC curve.

UNIT - III
Naïve Bayes and Discriminant Analysis: Bayes theorem, Naïve Bayes classifiers, Discriminant analysis; **Support Vector Machines**: Linear SVM, Kernel-based classification; **Decision Trees and Ensemble Learning**: Binary Decision trees, Introduction to Ensemble Learning-Random Forests, AdaBoost, Gradient Tree Boosting, Voting classifier.

UNIT - IV

Clustering Fundamentals: Basics, k-NN, Gaussian mixture, K-means, Evaluation methods, DBSCAN, Spectral Clustering, Hierarchical Clustering; **Introduction to Neural Networks**: Introduction to deep learning, MLPs with Keras, deep learning model layers, introduction to Tensorflow.

UNIT - V

Machine Learning Architectures: Data collection, Normalization and regularization, Dimensionality reduction, Data augmentation, Modeling/Grid Search/Cross-validation, Visualization, GPU support, Introduction to distributed architectures, Scikit-learn tools for ML architectures, pipelines, Feature unions

Text Books:
1. Giuseppe Bonaccorso, "Machine Learning Algorithms", 2nd Edition, Packt, 2018,
2. Tom Mitchel "Machine Learning", Tata McGraW Hill, 2017

Suggested Reading:
1. Abhishek Vijavargia "Machine Learning using Python", BPB Publications, 1st Edition, 2018
2. ReemaThareja "Python Programming", Oxford Press, 2017
3. Yuxi Liu, "Python Machine Learning by Example", 2nd Edition, PACT, 2017

Online Resources:
1. https://www.guru99.com/machine-learning-tutorial.htm
2. https://www.tutorialspoint.com/machine_learning_with_python/index.htm
                                        https://www.geeksforgeeks.org/machine-learning/

CYBER SECURITY

(PROFESSIONAL ELECTIVE

Instruction	3 Hours per week
Semester End Examination	3 Hours 70 Marks
CIE	30 Marks
Credits	3

Pre-requisites: Operating System, Computer Network, Cryptography

Course Objectives: The objectives of this course are

1. To Identify and present indicators that a cybercrime has occurred and understand methods and tools used in cybercrimes.

2. To collect, Process, Analyze and Present Computer Forensics Evidence.

3. To understand the legal perspectives and Organizational implications of Cyber Security

Course Outcomes: On Successful completion of this course, student will be able to

1. List the different types of cybercrimes and analyze legal frameworks to handle cybercrimes.

2. Identify the Tools and Methods used in cybercrimes.

3. Analyze and resolve cyber security issues and laws governing Cyberspace.

4. Describe the need of Digital Forensics and the importance of digital evidence in prosecution.

5. Interpret the commercial activities in the event of significant information security incidents in the Organization.

6. Discuss the vulnerabilities in networking protocols and their mitigation techniques.

UNIT - I
Introduction to Cyber Crime: Cyber Crime: Definition and Origins of the Word, Cyber crime and Information Security, Classification of Cyber Crimes, Cyber Crime: The Legal Perspective, Cyber Crime: An Indian Perspective, A Global Perspective of Cyber Crime.

UNIT - II
Cyber Offenses: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector. **Tools and Methods Used in Cybercrime:** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT - III

Cyber Security: The Legal Perspectives**:** Cyber Crime and the Legal Landscape around the World, Need of Cyber laws: the Indian Context, The Indian IT Act, Challenges to Indian Law and Cyber Crime Scenario in India, Digital Signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber Law, Technology and Students: The Indian Scenario.

UNIT - IV

Understanding Cyber Forensics: Introduction ,Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Cyber Forensics Investigation, Challenges in Computer Forensics.

UNIT - V

Cyber security: Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books:
1. Sunit Belpre and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt,Ltd,2011
2. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.

Suggested Reading:
1. Alfred Basta, Nadine Basta, Mary Brown, Ravinder Kumar, "Cyber Security and Cyber Laws", Paperback – 2018.
2. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge university press, 2006.

Online Resources:
1. https://www.edx.org/learn/cybersecurity
2. https://www.coursera.org/courses?query=cyber%20security
3. https://swayam.gov.in/course/4002-cyber-law

BASICS OF ARTIFICIAL INTELLIGENCE

(Open Elective)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Pre-requisites: Basic Mathematics.

Course Objectives: The main objectives of this course are:

1. Provide a strong foundation of fundamental concepts in Artificial Intelligence.

2. Discuss the various paradigms involved in solving an AI problems which involve perception, reasoning and learning

3. Apply the AI concepts to build an expert system to solve the real-world problems.

Course Outcomes: On Successful completion of this course, student will be able to

1. Identify various search strategies to solve problems.

2. Compare and contrast knowledge representation schemes.

3. Apply Bayesian Networks and Dempster Shafer theory for reasoning 4. Explain the role of agents and interaction with the environment

5. Determine different learning paradigms.

6. Explain robotic architectures and expert systems.

UNIT - I
Introduction: Definition, history, applications. Problem Solving: AI problems, AI Technique, Defining problem as a State-Space Search, Problem Characteristics. Heuristic Search Techniques: Generate and test, Hill Climbing, Constraint Satisfaction.

UNIT - II
Knowledge Representation (Logic): Representing facts in logic, proposition logic, predicate logic, resolution and unification. Knowledge Representation (Structured): Declarative representation, Semantic nets, procedural representation, frames.

UNIT - III

Reasoning: Probability and Bayes theorem, Certainty factors and Rule based systems, Bayesian Networks, Dempster-Shafer Theory. Planning: Components, goal stack planning, nonlinear planning, hierarchical planning.

UNIT - IV
Learning: Introduction, Rote learning, learning by taking advice, learning in problem solving and learning from examples: Decision tree. Intelligent Agents: Classification, Working of an agent, single agent and multi agent systems, multi agent application.

UNIT - V
Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition. Perception and Action: Real Time Search, Vision, Speech Recognition, ACTION: Navigation, Manipulation, Robot architectures.

Text Books:
1. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence", 3rd Edition, 2008
2. Russell Norvig, "Artificial Intelligence-Modern Approach", 3rd edition, 2010.

Suggested Reading:
1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2012.
2. Nelson M. Mattos, "An Approach to Knowledge Base Management", Springer Berlin Heidelberg, 1991.

Online Resources:
1. http://nptel.ac.in/courses/106106126/

   http://nptel.ac.in/courses/106105077/

MOBILE APPLICATION DEVELOPMENT

(PROFESSIONAL ELECTIVE-I)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Pre-requisites: Programming language skills, Problem solving skills, Applying technologies.

Course Objectives: The objectives of this course are

1. To demonstrate their understanding of the fundamentals of Android operating systems.

2. To demonstrate their skills of using Android software development tools.

3. To demonstrate their ability to develop software with reasonable complexity on mobile platform.

Course Outcomes: On Successful completion of the course, students will be able to

1. Interpret and Analyze Android platform architecture and features to learn best practices in Android programming.

2. Design the User Interface for Mobile applications.

3. Apply Intents, Broadcast receivers and Internet services in Android App.

4. Develop database management system to retrieve and/or store data for Mobile application.

5. Evaluate and select appropriate Android solutions to the Mobile computing platform.

6. Build Android applications for complex problems.

UNIT - I
Introduction to Android Operating System: Android SDK Features, Developing for Android, Best practices in Android programming, Android Development Tools. Android application components – Android Manifest file, Externalizing resources, The Android Application Lifecycle, A Closer Look at Android Activities.

UNIT - II
Android User Interface: Introducing Layouts, User Interface (UI) Components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers. Event Handling – Handling clicks or changes of various UI components. Introducing Fragments, Multi-screen Activities.

UNIT - III

Intents and Broadcasts: Introducing Intents: Using Intents to Launch Activities. Using Intent to dial a number or to send SMS. **Broadcast Receivers** –Creating Intent Filters and Broadcast Receivers: Using Intent Filters to Service Implicit Intents. Finding and using Intents received within an Activity. Notifications – Creating and Displaying notifications, Displaying Toasts.

UNIT - IV

Persistent Storage: Files – Reading data from files, listing contents of a directory, Creating and Saving Shared Preferences, Retrieving Shared Preferences. Database –Introducing Android Databases, Introducing SQLite, Content Values and Cursors, Working with SQLite Databases. Registering Content Providers, Using content Providers (insert, delete, retrieve and update).

UNIT - V

Advanced Topics: Alarms –Using Alarms. Using Internet Resources – Connecting to internet resource, using download manager. Location Based Services –Using Location-Based Services, Using the Emulator with Location-Based Services.

Text Books:
1. Reto Meier, "Professional Android 4 Application Development", Wiley India, (Wrox), 2012
2. James C Sheusi, "Android Application Development for Java Programmers", Cengage Learning, 2013

Suggested Reading:
1. Wei-Meng Lee, "Beginning Android 4 Application Development", Wiley India (Wrox), 2013

IMAGE PROCESSING

(PROFESSIONAL ELECTIVE-I)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Pre-requisites: Analysis of algorithms and linear algebra.

Course Objectives: The objectives of this course are

1. Gain the fundamentals of digital image processing.

2. Comprehend the relation between human visual system and machine perception and processing of digital images.

3. Provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.

Course Outcomes: On Successful completion of this course, student will be able
to 1. Explain the basic principles of image processing and its significance in real world.

2. Interpret various types of images and applies image transformations.

3. Evaluate various approaches for image segmentation and image restoration.

4. Define image processing methods and recognize morphological image processing techniques.

5. Recognize image compression and comprehend image compression techniques in both domains.

6. Apply image processing algorithms for real world problems.

UNIT - I
Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. **Image Transforms:** 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT - II
Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT - III
Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, thresholding, Region Oriented Segmentation.

UNIT - IV
Morphological Image Processing: Basics, Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation. Boundary Detection, Hole filling, Connected components, convex hull, thinning, thickening, skeletons, pruning, Geodesic Dilation, Erosion, Reconstruction by dilation and erosion.

UNIT - V
Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

Text Books:
1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson 4th Edition, 2018.
2. S Jayaraman, S Esakkirajan, T Veerakumar, "Digital Image Processing", McGraw Hill Education, 2010.

Suggested Reading:
1. Scotte Umbaugh, "Digital Image Processing and Analysis: Human and Computer Vision Application with using CVIP Tools", CRC Press,2nd Ed, 2011.
2. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, "Digital Image Processing using MATLAB", McGraw Hill Education, 2nd Edition, 2010.
3. Somka, Hlavac, Boyle, "Digital Image Processing and Computer Vision", Cengage Learning (Indian edition) 2008.
4. Adrian Andrew Low, "Introductory Computer Vision Imaging Techniques and Solutions", BS Pub, Second Edition, 2008.

Online Resources:
1. https://nptel.ac.in/courses/117105079/

2. www.nptelvideos.in/2012/12/digital-image-processing-html

WEB AND INTERNET TECHNOLOGIES LAB

(PROFESSIONAL ELECTIVE-I LAB)

Instruction

	3 Hours
	50 Marks
CIE	25 Marks
Credits	1.5

Pre-requisites: Programming and Problem Solving, Object Oriented Programming, DBMS.

Course Objectives: The objectives of this course are
1. To acquire knowledge of XHTML, Java Script and XML to develop web applications.
2. Ability to develop dynamic web content using Java Servlets, JSP and JDBC.
3. To understand the design and development process of a complete web application.

Course Outcomes: On Successful completion of this course, student will be able to
1. Students will be able to develop static web sites using XHTML and CSS
2. Validate form data and create dynamic content using javascript 3. Develop Dynamic web content using Java Servlets and JSP
4. Handle Sessions and use servlet filters in web applications.
5. Validate form data and create dynamic content using javascript

LIST OF PROGRAMS
1. Design simple web pages using XHTML and CSS.
2. Categorize the content of web page using XML and validate using DTD and XML schema.
3. Create well structured, easily maintained web pages using CSS and Java script.
4. Examine dynamic web pages using Java script.
5. Design a dynamic webpage that meets specified requirements and interests of end users.
6. Apply the concepts of Inheritance and interfaces to solve complex problems.
7. Analyse and apply the concepts of Exception handling and packages.
8. Handling HTTP Sessions in web applications.
9. Demonstrate Servlet Collaboration using Servlet Context.
10. Creation of dynamic content in web application using JSP.
11. Provide a program level interface for communicating with database using JDBC.

Text Books:
1. Robert W Sebesta, "Programming the World Wide Web", Pearson Education, 2013
2. Cedit Buest, Subramanyam Allamraju, "Professional Java Server programming: J2EE 1.3 Edition", Apress Publications, 2007.

Suggested Reading:
1. Santosh Kumar K, "JDBC 4.2, Servlet 3.1 and JSP 2.3 Includes JSF 2.2 and Design Patterns", 2nd edition, 2016.

Online Resources:
1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/servlets/index.htm.
3. https://www.oracle.com/technical-resources/articles/javase/servlets-jsp.html

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Pre-requisites: Basics of Python Programming.

Course Objectives: The objectives of this course
are 1. Understand the essence of GUI
programming.

2. Identify various GUI frameworks.
3. Develop GUI based applications using GUI tools/frameworks.

Course Outcomes: On Successful completion of the course, students will be able
to 1. Understand GUI frameworks / tool required for GUI programming.

2. Explore the features of PyQt for the develop GUI applications.
3. Customize GUIs by using layout managers and look-and-feel features.
4. Develop beautiful charts using the free Matplotlib Python module.
5. Design and develop UIs using threading in a networked environment to make the GUIs responsive and compatible with Android, iOS.

UNIT - I
Introduction to GUI Programming: UI and interaction design, examples, components of GUI, comparison to other interfaces, 3-D user interfaces, and other GUI frameworks. **Introduction to PyQt5 Framework:** Overview, installation of PyQt framework, creation of a simple GUI, adding widgets to GUI, layout of widgets.

UNIT - II
Design of GUIs with Qt Designer: Installation of Qt Designer and tools, creation of a GUI, adding widgets, conversion of Qt Designer UI code to Python code.

UNIT - III
Enhancing Qt5 GUI functionality: Calling Dialogs from main window, decoupling Python code from generated UI code, building a complex GUI with PyQt5, Multi-threading to keep GUI responsive, Drag and Drop within the PyQt5 GUI.

UNIT - IV
Advanced Qt5 Programming: OpenGL Graphics library, networking and SQL database, Animation inside the GUI, CSS styling to enhancement for look-and- feel, PyQt's signals and slots, event handling.

UNIT - V

User Interface Design: Design of uesr interfaces, displaying Google and Qt5 Maps, creation of iPhone and Android Apps with Qt5. **Creation of 3D GUI with PyOpenGL and Pyglet**: PyOpenGL transforms for GUI, GUI in 3D, Pyglet transform for easy GUI, creation of slideshow using tkinter, best practices.

Text Books:
1. Burkhard A. Meier "Python GUI Programming Recipes using PyQt5", Packt, 2017.
2. Burkhard A. Meier, "Hands-on Python 3.x GUI Programming: Pack 2019.

Online Resources:
1. https://en.wikipedia.org/wiki/Graphical_user_interface#Technologies.
18CSE03

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System
B.E (Computer Science and Engineering)

SEMESTER – IV

S. No	Course Code	Title of the Course	Scheme of Instruction Hours per week L/T	Scheme of Instruction Hours per week P/D	Duration of SEE in Hours	Maximum Marks CIE	Maximum Marks SEE	Credits
			THEORY					
1	16CS C10	Data Base Management Systems	3	-	3	30	70	3
2	16CS C11	Web Technologies	3	-	3	30	70	3
3	16CS C12	Computer Architecture and Micro Processors	3/1	-	3	30	70	4
4	16CS C13	Probability and Statistics Using R	3	-	3	30	70	3
5	16CS E01/02/03	ELECTIVE - I	3	-	3	30	70	3
6	16MB C01	Engineering Economics and Accountancy	3	-	3	30	70	3
			PRACTICALS					
7	16CS C14	Data Base Management Systems Lab	-	3	3	25	50	2
8	16CS C15	Web Technologies Lab	-	3	3	25	50	2
9	16CS C16	CA and MP Lab	-	3	3	25	50	2
		TOTAL	19	9	-	255	570	25

ELECTIVE-I

S.No.	Course Code	Title of the Course
1	16CS E01	Linux Programming and Scripting Languages
2	16CS E02	Principle of Programming Languages
3	16CS E03	Shell Scripting

L: Lecture   T: Tutorial   D: Drawing   P: Practical
CIE - Continuous Internal Evaluation   SEE - Semester End Examination