

**SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHA VIDYALAYA**  
**FACULTY OF SCIENCE**  
**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS**

**DEGREE OF BACHELOR OF COMPUTER APPLICATIONS (B.C.A)**

**REGULATIONS**

(Effective from the Academic Year 2017-18)

**OBJECTIVES**

The course strives to inculcate job-oriented and value based quality education in Information Technology and Commercial Application Development. At the end of the course, the students will be well-versed, particularly in core subjects with quality in inter-personal and professional skills.

- To provide a foundation of computing principles and business practices for effectively using / managing information systems and enterprise software.
- To help students analyze the requirements for system development.
- To expose students to business software and information system.
- To provide options to specialize in Legacy Application Software, System Software.

**SCOPE FOR EMPLOYMENT**

- A plethora of opportunities in applications development, software testing and maintenance.
- Options to pursue MCA, M.Sc.-CS/IT, MBA
- Employment in IT-enabled service sectors as System Analyst and Database Administrators

**ELIGIBILITY FOR ADMISSION**

Candidates for admission to the first year of the Degree of Bachelor of Computer Applications shall be required to have passed the Higher Secondary Examination conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent thereof by the University authorities, with Mathematics / Business Mathematics / Statistics / Computer Science / Commerce as one of the subjects in XII Std. The upper age limit to join the first year is 19.

For Lateral Entry to II year, Candidates for admission to the Second year of the Degree of Bachelor of Computer Applications shall be required to have passed the Diploma in Computer Technology Examination conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent thereof by the University authorities. The upper age limit to join the second year is 21.

## DURATION OF THE COURSE

The Course duration shall be for three years consisting of six semesters. In order to be eligible for the award of the degree the candidate shall successfully complete the course in a maximum period of Six years from the date of enrolment for the first semester of the course.

## REGISTRATION OF COURSE

A newly admitted student will automatically be registered for all the courses prescribed for the first semester without option. Every student shall submit a completed registration form indicating the list of courses intended to be credited during the second to final semester. This registration will be done a week before the last working day of the current semester.

## CHOICE BASED CREDIT SYSTEM

The University follows the 'Choice Based Credit System (CBCS)' for all its programmes. Each course is normally assigned one credit per lecture per week and one credit for two periods of tutorials or part thereof for laboratory or practical per week.

### Structure of the Course and Evaluation Pattern

**Internal Marks: 40    External Marks: 60**

The duration of University examination for both theory and practical subjects shall be 3 hours. The maximum marks for each theory and practical course is 100. Continuous Internal Assessment (CIA) will be for 40. The university theory examination will be conducted for 100 marks, which will be then converted to 60 in order to add with continuous internal assessment to make 100 marks for the course. For the conduct of University examinations in practical, the question paper for the practical examination will be set by both internal and external examiners appointed by the University.

### Procedures for Awarding Marks for Internal Assessment

The break-up of assessment and examination marks for theory subjects is as follows.

First Assessment (Test)	:	15 Marks
Second Assessment (Test)	:	15 Marks
Assignment & Attendance	:	10 Marks
		-----
Internal Assessment	:	40 Marks
University Examination	:	60 Marks
		-----
Total	:	100 Marks

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The break-up of the assessment and examination marks for practical is as follows.

Observation	:	10 Marks
Model Examinations	:	20 Marks
Record book	:	10 Marks
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Internal Assessment	:	40 Marks
University Examination	:	60 Marks
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Total	:	100 marks
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The break-up of assessment (**Internal Assessment Only**) for the subjects Indian Culture, Value Education, Environmental Science and Skills for Human Resource Development is as follows:

Assignment	:	10	Marks
First Internal Test	:	30	Marks
Second Internal Test	:	30	Marks
Seminar	:	10	Marks
Quiz/Objective type test	:	10	Marks
Attendance	:	10	Marks
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Total	:	100	marks
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#### **REQUIREMENTS FOR THE COMPLETION OF THE SEMESTER**

The candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for the completion of the semester.

1. He/ She secures not less than 80% of overall attendance in that semester taking into account the total number of periods in all courses put together attended by the candidate as against the total number of periods in all courses offered during that semester. Condonation of attendance up to 10% is permitted on medical grounds. Relaxation in attendance is permitted up to 10% for the student who represents the university in sports and games. The above two relaxation cannot be taken concurrently.
2. His / Her conduct has been satisfactory throughout the semester. Candidates who do not complete the semester will not be permitted to write the end semester Examination and are not permitted to go the next semester. They are required to repeat the incomplete semester in the next academic year.

## **REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER**

- i. Candidates shall register their name for the First Semester Examination after the admission in the U.G. course.
- ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subsequent) semester subjects.
- iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed thereof by the University from time to time.  
Provided in the case of candidate earning less than 50% of attendance in any one of the semesters due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Dean, Faculty of Science, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates will have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

## **STUDENT MENTOR**

To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a member of the faculty who shall function as student Mentor for those students throughout their period of study. Such student Mentor shall advise the students, give preliminary approval for the courses to be taken by the students during each semester and obtain the final approval of the Head of the Department.

## **CLASS COMMITTEE**

The composition of the class committees will be as follows.

- Course co-ordinators of the common courses, if any , who shall be appointed by the Head of the Department from among the staff members teaching the common course.
- A co-ordinator (in the sixth semester committee only) for software development lab who shall be appointed by the Head of the Department from among the supervisors.
- Teaching staff of other individual courses
- One professor, preferably not teaching the concerned class, appointed by the Head of the Department from among the supervisors.
- The Head of the Department may opt to be a member or the Chairman.

- All student counsellors of the class , and the Head of the Department (if not already a member) or any staff member nominated by the Head of the Department may opt to be special invitees.
- The class committee shall meet THREE times during the semester
- ❖ The first meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.
- ❖ The second meeting will be held within a week after the second assessment is completed to review the performance and for follow-up action.
- ❖ The third meeting will be held after all the assessments are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 40 marks will be finalized for every student and tabulated and submitted to the head of the department.

#### **WITHDRAWAL FROM A COURSE**

A student can withdraw from a course at any time before a date fixed by the Head of the Department prior to the second assessment, with the approval of the Dean of the faculty on the recommendation of the Head of the Department.

#### **DISCIPLINE**

Every student is required to observe disciplined and decorous behavior both inside and outside the college and not to indulge in any activity which will tend to bring down the prestige of the University. Boys should wear decent dresses. No casual wear like T – shirts or jeans pant is permitted. Girls shall wear decent dresses like churidars with Thuppattas and sarees.

#### **REVISION OF REGULATION AND CURRICULUM**

The University may from time to time revise, amend or change the regulations, scheme of examinations and syllabi as found necessary.

#### **Authority of Board of Studies**

The Board of Studies has the full authority to change the syllabus any time according to IT trend and industry needs.

#### **SUBSTITUTE ASSESSMENT:**

A student who has missed one or more of assessment tests of a course other than the examinations for genuine reasons as accepted by the Head of the Department may take a substitute assessment for any one of the missed assessment. A student who wishes to have a substitute assessment for missed assessment must apply to the Head of the Department within two week from the date of the missed assessment.

## EXAMINATIONS

1. The end semester examinations will ordinarily be conducted during October to December in the odd semesters and during March to May in the even semesters. For all the theory courses question papers will be set by external examiners and valued by external and/or internal examiners.
2. All practical examinations including software development lab will be conducted by internal & External examiners appointed by the University

## PASSING AND DECLARATION OF EXAMINATION RESULTS:

### PASSING MINIMUM

1. A candidate shall be declared to have passed in each paper / practical if he / she secures not less than 40% of marks (the continuous internal assessment (CIA) and the University examinations (External) put together), provided a minimum of 35% of marks secured in the University examination.
2. If a candidate fails to secure a pass in a particular course, it is mandatory that he/she shall register and reappear for the examination in that course during the next semester when examination is conducted in that course. He / She should continue to register and reappear for the examination till he/she secures a pass. However, the internal assessment marks obtained by the candidate in the first attempt shall be retained and considered valid for all subsequent attempts.

Assessments of all the courses on absolute marks basis will be considered and passed by the Results – Passing- Board in accordance with the rules of the University. Thereafter, the Controller of Examinations shall convert the marks of each course to the corresponding letter grade as stated below, compute the grade point average and the cumulative grade point average, and prepare the grade cards

90 to 100	:	Grade "S"
80 to 89	:	Grade "A"
70 to 79	:	Grade "B"
60 to 69	:	Grade "C"
50 to 59	:	Grade "D"
40 to 49	:	Grade "E"
Less than 40 marks	:	Grade "F"

A Student who obtains less than 40 marks out of 100 in the examination OR is absent for the examination will be awarded the "F" grade. A Student who earns a grade of S, A, B, C, D or E in a course is declared to have successfully completed that course and earned the respective credits for that course. Such a course cannot be repeated by the student.

A Student who obtains a letter grade “ F “ in a course is to reappear for the examinations in that course.

The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

S – 10; A – 09; B – 08; C – 07; D – 06 ; E – 05; F - 0

A Student can apply for revaluation of one or more of her/his examination answer papers within a week from the *date of display of the result* on payment of the prescribed fee. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After the results are declared, grade cards will be issued to the student. The grade cards will contain the list of courses registered during the year/ semester, the grades scored and the grade point average (GPA) for the year/ semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the course for the year/semester, divided by the sum of the number of credits for all courses taken in that year/semester. CGPA is similarly calculated by considering all the courses taken from the time of admission.

After successful completion of the programme, the degree will be awarded with the following classification based on CGPA.

For the first class with distinction the student should have passed all the courses in the first attempt and obtained a minimum CGPA Of 8.25.

For the first class, the student must have earned a minimum CGPA of 6.5 within four years from the time of admission.

For the second class the student must have completed the course within six years from the time of admission.

- The total credits of the course are 140.
- The total credits of the course (Lateral Entry) are 96.

## **ELIGIBILITY FOR THE AWARD OF THE DEGREE**

A Student shall be declared to be eligible for the award of the Degree provided if,

1. The student has successfully completed the course requirements and has passed all the prescribed examinations in all the six semesters within a maximum period of six years reckoned from the commencement of the first semester to which the candidate was admitted.
2. No disciplinary action is pending against him/her.

## **PATTERN OF QUESTION PAPER (THEORY)**

Time : 3 hours Max Marks : 100

**Part – A (10 \* 2 = 20 Marks)**  
(2 Question from each unit) Theory

**Part – B (5 \* 16 = 80 Marks)**  
(1 Set from each Unit (Either or Pattern))

Marks secured by the candidate will be converted to 60 to make the aggregate 100, while adding with Continuous Internal Assessment 40.

## **PATTERN OF QUESTION PAPER (PRACTICAL)**

Time : 3 Hours Max : 60 Marks.

One compulsory lab exercise (may contain subdivisions) to be solved within 3 hours. The External Examiner will set a question paper on the spot with the help of the question bank or list of exercise. Each student will get a single question to be answered. The question will have two subdivisions (2 x 20 = 40), 10 for Record and 10 for viva- voice. No more than three candidates should get the same question in a batch.

## **STRUCTURE OF THE COURSE**

The course of the B.C.A Degree shall consist of the following subjects.

1. Foundation Courses: The course shall comprise the study of,
  - a) Part-I Tamil / Sanskrit /Hindi
  - b) Part-II English
2. Core Courses:
  - a) Main Subject
  - b) Allied Subjects
  - c) Application Oriented subjects related to the main subject of study and practical etc.



## SCHEME OF EXAMINATIONS

BCA									
Sem	S.No.	Subject Code	Subject	Hrs	L	T	P	C	Total
I	1	LT101 / LS101/ LH101	Tamil – I / Sanskrit-I / Hindi-I	4	2	2	0	3	22
	2	LE102	English – I	4	2	2	0	3	
	3	CC103	Programming in C	5	3	2	0	4	
	4	CC104	Digital Principles and Its Applications	5	3	2	0	4	
	5	CM105	Mathematical Foundation to Computer Science	5	3	2	0	4	
	6	CC106	Programming in C Lab.	6	0	0	6	3	
	7	IC107	Indian Culture	1	1	0	0	1	
II	1	LT201 / LS201/ LH201	Tamil –II / Sanskrit-II / Hindi-II	4	2	2	0	3	22
	2	LE202	English – II	4	2	2	0	3	
	3	CC203	Object Oriented Programming with C++	5	3	2	0	4	
	4	CC214	Principles of information technology	5	3	2	0	4	
	5	CM205	Computer Associated Numerical Methods	5	3	2	0	4	
	6	CC216	OOPS Lab.	6	0	0	6	3	
	7	CC207	Value Education	1	1	0	0	1	
III	1	LE302	English – III	4	2	2	0	3	24
	2	CC313	Computer Graphics and Multimedia	4	2	2	0	3	
	3	CC314	Relational Data Base Management Systems	5	3	2	0	4	
	4	CC315	Data Structures and Algorithms	5	3	2	0	4	
	5	CC306	Fundamentals of Accounting	5	3	2	0	4	
	6	CC307	RDBMS Lab.	6	0	0	6	3	
	7	CC308	Basics of Environmental Science	3	3	0	0	3	
IV	1	LE402	English-IV	4	2	2	0	3	23
	2	CC413	Computer system Architecture	5	3	2	0	4	
	3	CC414	JAVA Programming	5	3	2	0	4	
	4	CC415	Cost and Management Accounting	5	3	2	0	4	
	5	CC416	Elective – I Organizational Behavior	4	4	0	0	4	
	6	CC417	Java Programming Lab	6	0	0	6	3	
	7	CC418	English -Communications Skills- Lab	2	0	0	2	1	
V	1	CC511	Web Technology	5	3	2	0	4	24
	2	CC512	Operating systems	5	3	2	0	4	
	3	CC503	VB .NET	5	3	2	0	4	
	4	CC514 CC524	Elective – II E-Commerce Elective – II Network Security	4	4	0	0	4	
	5	CC515	Web Technology Lab	6	0	0	6	3	
	6	CC506	VB .NET Lab	6	0	0	6	3	
	7	CC507	Skills for Human Resource Development	2	2	0	0	2	
VI	1	CC611	Computer Networks	5	3	2	0	4	25
	2	CC612	Software Engineering	5	3	2	0	4	
	3	CC613	Programming with PYTHON	5	3	2	0	4	
	4	CC614	Elective – III Data Mining	4	4	0	0	4	
	5	CC615	Software Development Lab	8	0	0	8	6	
	6	CC616	PYTHON LAB	6	0	0	6	3	
			Total Credits						140

L – Lecture Hrs    T – Tutorial Hrs    P - Practical Hrs    C- Credits

**ELECTIVE - I (IV Semester)**

- Organizational Behavior
- Management Information Systems

**ELECTIVE – II (V Semester)**

- E-commerce
- Network Security

**ELECTIVE – III (VI Semester)**

- Data Mining
- Cloud Computing

**ALLIED SUBJECTS**

- Mathematical Foundation to Computer Science
- Computer Oriented Numerical Methods
- Fundamentals of Accounting
- Cost and Management Accounting

**SKILL DEVELOPMENT COURSES (INTERNAL ASSESSMENT ONLY):**

Semester I - Indian Culture

Semester II – Value Education

Semester III - Basics of Environmental Science

Semester IV - Skills for Human Resource Development

LT101	Tamil – I	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

**முதல் பருவம்**

**அலகு – 1**

தமிழ் இலக்கிய வரலாறு

1. நாட்டுப்புற இலக்கிய வரலாறு,  
நாட்டுப்புறப் பாடல்கள், நாட்டுப்புறக் கதைகள்,  
நாட்டுப்புறக் கதைப் பாடல்கள், பழமொழிகள்,  
விடுகதைகள்
2. உரைநடை இலக்கிய வரலாறு  
சிறுகதைகள் தோற்றமும் வளர்ச்சியும்
3. கவிதை இலக்கிய வரலாறு  
புதுக் கவிதைகள் தோற்றமும் வளர்ச்சியும்
4. நாடக இலக்கியத்தின் தோற்றமும் வளர்ச்சியும்  
(சிலப்பதிகாரம் முதல் தற்கால நாடகம் வரை)

**அலகு – 2**

1. வாய்மொழி இலக்கியம் நாட்டுப்புறப் பாடல்கள்  
தாலாட்டு, காதல், ஒப்பாரி
2. புதுமைப்பித்தன் சிறுகதைகள்  
கடவுளும் கந்தசாமிப் பிள்ளையும் , செல்லம்மா  
துன்பக்கேணி, ஆற்றங்கரைப் பிள்ளையார், பொன்னகரம்

**அலகு – 3**

1. பாரதியார்  
காணி நிலம் வேண்டும், நல்லதோர் வீணை
2. பாரதிதாசன்  
தமிழ்க் காதல், தமிழ் வளர்ச்சி, எந்நாளோ?
3. கவிமணி தேசிய விநாயகம் பிள்ளை  
குழந்தைக்கவி  
ஆறு தன் வரலாறு கூறுதல்

**அலகு – 3**

1. ந. பிச்சமுர்த்தி – வழித்துணை
2. சிற்பி – முள்... முள்... முள்...
3. அப்துல் ரகுமான் – குருடர்களின் யானை

**அலகு – 5**

மொழிப் பயிற்சி

1. பொருத்திய சொல் தருதல்
2. மரபுத் தொடர்கள்

LS101	SANSKRIT – I	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

**Unit - I भाग: - क**

1. Vowels & Consonants
2. Words begin with vowels
3. Words begin with क to ण
4. Words begin with त to ह

**Unit - II भाग: - ख**

1. Words begin with क to झ with the combination of Vowels.
2. Words begin with ट to न with the combination of Vowels.
3. Words begin with प to ह with the combination of Vowels.
4. Combined Letters.
5. Simple Sentences.

**Unit - III भाग: - ग**

1. Lessons from text book 1-6.

**Unit - IV भाग: - घ**

1. Lessons from text book 7-12.

**Unit - V भाग: - ङ**

**1. शब्दरूपाणि**

- |          |           |             |          |
|----------|-----------|-------------|----------|
| 1. देवः  | 6. छात्रा | 11. वनम्    | 16. इदम् |
| 2. मुनिः | 7. मतिः   | 12. अस्मद्  | 17. किम् |
| 3. गुरुः | 8. गौरी   | 13. युष्मद् |          |
| 4. पितृ  | 9. धेनुः  | 14. तद्     |          |
| 5. गो    | 10. मातृ  | 15. एतद्    |          |

**2. धातुरूपाणि (Present tense, Past tense and Future tense) परस्मैपद-आत्मनेपदधातवः**

1. भू धातुः
2. पठ् धातुः
3. गम् धातुः

**Text Books -**

1. Samskrita Siksha - Part I & II

Published by Department of Sanskrit and Indian culture, SCSVMV University (Deemed University), Enathur, Kanchipuram.

LH101	Hindi – I	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

**OBJECTIVES:**

1. To develop communication skills and writing skills in Hindi for the students belong to Non- Hindi speaking areas.
2. To create opportunities to the students to enter into job filed of Central Govt. Offices through Hindi.

**UNIT –I: INTRODUCTION TO HINDI SCRIPT AND SPELLINGS:**

- a) Vowels
- b) Consonants
- c) Often wrong spelt words- corrections

**UNIT – II: BASICS OF HINDI VOCABULARY**

- a) Greeting words and introductory words
- b) Words for daily usage and spoken purpose
- c) Names, Counting of Numbers, colors, Vegetables, Flowers, Fruits and time calculation

**UNIT – III: INTRODUCTION TO HINDI GRAMMAR**

- a) Parts of speech
- b) Gender
- c) Number
- d) Synonyms
- e) Antonyms

**UNIT – IV: INTRODUCTION TO HINDI LANGUAGE WRITING**

- a) Application of case-endings (karak)
- b) Sentence formation
- c) Changing the sentence according to the direction

**UNIT – V**

- a) Usage of Tenses
- b) Change of Tenses
- c) Writing the sentence with the help of verbs
- d) Transcription of paragraph
- e) spoken Hindi practice

LE101	ENGLISH – I	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

(For Students admitted from 2017 onwards)

### Objectives:

The purpose is to enable students to be familiar with 20<sup>th</sup> century English Prose together with elements of Grammar.

### Unit I: Characters from Ramayana

1. Sri Rama
2. Sita Devi
3. Lakshmana

### Unit II: Characters from Ramayana

4. Bharata
5. Dasaratha
6. Tolerance

### Unit III: Vocabulary from the Essays

### Unit IV: Basic Grammar

1. Articles
2. Pronouns –Personal & Impersonal
3. Adjectives
4. Synonyms & Antonyms
5. Sentence Structure

### Unit V: Communication through Grammar

6. Tense forms
7. Idioms & Phrases
8. Suitability & Verbs
9. E-Mail
10. Patterns of Greeting

### TEXT BOOK

1. Sivananda, Sri Swami. *Essence of Ramayana*. Rikhikesh: The Sivananda Publication

CC103	PROGRAMMING IN C	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- The objective of this subject is to help the students to learn programming concepts using C Language

### OUTCOMES

After completion of the course the students are expected to be able to:

- Design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and iterative structures, and functions using C.

### SYLLABUS

**UNIT-I : C fundamentals:** Character set - Identifier and keywords - data types - constants- Variables - Declarations - Statements - Operators – Expressions.

**UNIT-II : Data input and output functions:** - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements.

**UNIT-III : Functions:-**Definition - prototypes - Passing arguments – Recursion- Storage Classes - Automatic, External, Static, Register Variables.

**UNIT-IV : Arrays:** - Defining and Processing - Passing arrays to functions - Arrays and Strings. Structures and unions - Passing structures to functions - Unions - Bit wise operations.

**UNIT-V : Pointers:** - Declarations - Passing pointers to Functions - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files: Creating, Processing, Opening and Closing a data file.

### TEXT BOOKS

1. Henry Mullish, Herbert Cooper, The Spirit of C An Introduction to Modern Programming, Jaico Publishing House, 28<sup>th</sup> Impression, 2006.
2. Yashavant P. Kanetkar, Understanding Pointers In C , BPB Publications, NewDelhi, 14<sup>th</sup> Edition, 2016

### REFERENCE BOOK

1. Byron C Gotfried, Programming with C, Schuams' outline series, 3rd Edition, Tata McGraw Hill Education, 2017 .



<b>CC104</b>	<b>DIGITAL PRINCIPLES AND ITS APPLICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

### **OBJECTIVES**

- Study various number systems
- To simplify the mathematical expressions using Boolean functions - simple problems.
- Study implementation of combinational circuits and sequential circuits.

### **OUTCOMES**

- Understand the basic number system and Boolean algebra.
- Understand the basics of combinational circuits and Sequential Circuits.

### **SYLLABUS**

**UNIT – I** NUMBER SYSTEM : Number systems: Decimal, Binary, Octal, Hexadecimal - Codes: ASCII code, Gray Code, BCD code - Complements - Error Detection and Error Correction.

**UNIT – II** BOOLEAN ALGEBRA: Truth Table - theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, K-map (upto 4 Variables), Don't care conditions.

**UNIT – III** COMBINATIONAL CIRCUITS: Digital logic gates - Design procedure - Universal Gates – Adder – Subtractor - Encoder – Decoder – Multiplexer – Demultiplexer.

**UNIT – IV** SEQUENTIAL CIRCUITS: Flip flop – SR Flip flop – D Flip flop - JK Flip flop - Master Slave Flip Flop.

**UNIT – V** REGISTERS AND COUNTERS: Registers– Shift Register – Ripple Counter – Synchronous Counter.

### **TEXT BOOK**

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India, Eastern Economy edition 2008

### **REFERENCE BOOKS**

1. Charles H.Roth, 'Fundamentals Logic Design', Jaico Publishing, VII edition, 2014.
2. Floyd, 'Digital Fundamentals', 11th edition, Pearson Education, 2015.
3. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 7<sup>th</sup> edition, Tata McGraw Hill Publishing Company Limited, 2011.

CM105	MATHEMATICAL FOUNDATION TO COMPUTER SCIENCE	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science), B.C.A.]

### OBJECTIVES

- To Study basic Discrete mathematics required for computer science
- To learn the concepts of matrices, set theory and graph theory.
- To learn mathematical logic and relations.

### OUTCOMES

Understand the basic discrete mathematics principles.

- Understand the basics of matrices, set theory and graph theory.
- Understand Mathematical logic and relations.

### SYLLABUS

**UNIT I :**       **Matrices:** – Introduction – Determination – Inverse of a matrix – Rank of a Matrix  
- Eigen value Problems

**UNIT II :**       **Set theory:**-Introduction-Set & its Elements-Set Description-Types of sets-Venn-  
Euler Diagrams- Set operations & Laws of set theory-Fundamental products-partitions of  
sets-minsets- Algebra of sets and Duality-Inclusion and Exclusion principle

**UNIT III :**       **Mathematical logic:** Introduction- propositional calculus –Basic logical  
operations- Tautologies-Contradiction-Argument-Method of proof- Predicate calculus.

**UNIT IV :**       **Relations:**Binary Relations – Set operation on relations-Types of Relations –  
Partial order relation – Equivalence relation – Composition of relations – Functions – Types of  
functions – Invertible functions – Composition of functions.

**UNIT V :**       **Graph Theory :**Basic terminology – paths, cycle & Connectivity – Sub graphs -  
Types of graphs – Representation of graphs in computer memory - Trees – Properties of trees –  
Binary trees – traversing Binary trees – Computer Representation of general trees.

### TEXT BOOKS

1. Engineering Mathematics Volume II – Dr M.K. Venkataraman – NPC (Unit I)
2. Kenneth H. Rosen, Discrete Mathematics and its Applications, 6<sup>th</sup> Edition, Tata McGraw Hill, New Delhi. (2007).

### REFERENCE BOOKS

1. Discrete Mathematics Structures with Applications to computer science - J. P Tremblay R Manohar – McGraw Hill International Edition.
2. Discrete Mathematics – Dr M. K. Venketaramen, DrN.Sridharan, N. Chandarasekaran – The National publishing Company Chennai.

CC106	PROGRAMMING IN C LAB	L	T	P	C
		0	0	6	3

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To be able to get trained in programming skills using C with good formatting, user friendly and interactive with Program comments where ever necessary

### OUTCOMES

- Students will be familiar in programming in C

S.No	List of Programs
1	Program to print Fibonacci number
2	Program for prime number checking
3	Program to count the number of positive, negative and 0 values switch case statement
4	Program for palindrome checking
5	Program to print the given number in the reverse order using WHILE loop
6	Program to sort an array
7	Program to Addition of two matrices
8	Program to multiple two matrices
9	Program to sort names
10	Program to find the factorial of an integer using function
11	Program to interchange two values using function
12	Program to store the data entered from keyboard in a file

IC107	INDIAN CULTURE	L	T	P	C
		1	0	0	1

[Common for B.Sc.(Computer Science), B.C.A.]

**Unit I :** Introduction - Origin of Man and evolution of Cultures & Civilizations; significance of Indian Culture. Chronology of Indian Cultures; origin & spread; general features of Indian Cultures; Unity in Diversity.

**Unit II :** **Literature** – chronology of Indian Literature; Early Indian Literature in Sanskrit and Other languages;

**Unit III :** Early cultural centers in India – from Sindh to Kaveri; main features and important centers.

**Unit IV :** Early Indian Education - Gurukulas and Guru-sishya parampara. Evolution of script and languages; important early scripts and writing materials; important early educational centres (*ghattikas*).

**Unit V :** Scientific Heritage of India; Important Manuscripts – Amsu Bhodhini, Yantrasarvasva, Krisiparasara, Sulvasutra, Lohatantara, etc.

## REFERENCE BOOKS

1. Joshi, K. 1992(rp). *The Veda and Indian Culture*. Rastriya Veda Vidya Pratishthana. New Delhi.
2. Majumdar, R.C. 1994 (rp). *Ancient India*. Motilal Banarsidas Publishers. Delhi.
3. Patel, I.S. (ed). 1984. *Science and the Vedas*. Bombay.
4. Sri Chandrasekarendra Sarasvati Swamiji. 1991. *The Guru Tradition*. Bharatiya Vidya Bhavan. Bombay.
5. Sri Jayendra Saraswati Maharaj. 1951. *The Vedas and Vedangas*. Prakashan Kendra. Lucknow.
6. Vartak, P.V. 1986. *Scientific Knowledge in the Vedas*. Delhi.
7. Winternize, M. 1996(rp). *History of Indian Literature*. Delhi.

LT201	TAMIL – II	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

**இரண்டாம் பருவம்**

**அலகு – 1**

தமிழ் இலக்கிய வரலாறு

1. கிருத்துவ இலக்கிய வரலாறு
2. காப்பிய இலக்கிய வரலாறு

**அலகு – 2**

1. நந்திக் கலம்பகம்
2. முத்தொள்ளாயிரம்
3. தமிழ் விடு தூது

**அலகு – 3**

1. திருக்குற்றாலக் குறவஞ்சி (குறத்தி மலைவளம் கூறுதல்)
2. முக்கூடல் பள்ளு (நாட்டு வளம்)
3. இயேசு பிரான் பிள்ளைத் தமிழ் (செங்கீரைப் பருவம் முதல் 5 செய்யுள்கள்)

**அலகு – 4**

1. நளவெண்பா (கலி நீங்கு காண்டம்)

**அலகு – 5**

மொழிப் பயிற்சி

1. இலக்கண குறிப்புகள்  
பண்புத்தொகை, வினைத்தொகை,  
உம்மைத் தொகை, அன்மொழித் தொகை,  
இருபெயரொட்டுப் பண்புத்தொகை
2. ஒரு பொருள் குறித்த பல சொற்கள்
3. பல பொருள் குறித்த ஒரு சொல்
4. அகர வரிசைப்படுத்துதல்

LS201	SANSKRIT – II	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

**Unit - I भाग: - क**

**Poetry:** सुभाषितमाला I - 1 to 6 Slokas

**Prose:** Lessons 1 to 3 (From Sanskrit Pravesika)

**Unit - II भाग: - ख**

**Poetry:** सुभाषितमाला II - 1 to 8 Slokas

**Prose:** Lessons 4 to 6 (From Sanskrit Pravesika)

**Unit - III भाग: - ग**

**Grammar:**

1. अच्सन्धि:

2. हल्सन्धि:

**Unit - IV भाग: - घ**

**Essays :**

1. अस्माकं देश:

2. दीपावली महोत्सव:

3. संस्कृतप्रचारस्य आवश्यकता

**Unit - V भाग: - ङ**

**Slokas (Verses) :**

1. Sowndaryalahari (10 Slokas)

**TEXT BOOKS**

1. Subhashitamala, Prepared by Dept. of Sanskrit and Indian Culture, SCSVMV University.

2. Sowndaryalahari

<b>LH201</b>	<b>HINDI – II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

[Common for B.Sc.(Computer Science), B.C.A.]

**UNIT –I**

PARAGRAPH AND PRECISE WRITING IN HINDI:

- a) Comprehensive paragraph
- b) Paragraph Writing
- c) Simple translation of sentences

**UNIT – II**

HINDI LITERATURE – OLD POETRY

- a) Tulasi Das
- b) Rahim

**UNIT – III**

HINDI LITERATURE – MODERN POETRY

- a) Himadri se
- b) Bharat Mata

**UNIT – IV**

HINDI LITERATURE- PROSE

- a) Smriti

**UNIT – V**

HINDI LITERATURE- PROSE

- a) Sanyasi

**TEXT BOOKS:**

1. 'SARAL HINDI SIKSHA' -1 (Prepared by Department of Hindi, SCSVMV)
2. 'HINDI SAHITYA SUDHA' (Edited by Department of Hindi, SCSVMV)

LE202	ENGLISH - II	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]

(For Students admitted from 2017 onwards)

**Objectives:**

The purpose is to enable students to be familiar with 20<sup>th</sup> century English Prose together with elements of Grammar.

**Unit I: Stories from the Mahabharata**

1. Wilderness of Life
2. The Cat and the Mouse
3. The Salmali Tree

**Unit II: One Act Play**

Urubhangam - Bhasa

**Unit III: Vocabulary**

**Unit IV: Grammar I**

1. Relative pronouns
2. Adverbs
3. Prepositions
4. Phrasal verbs
5. Idioms

**Unit V: Grammar II**

6. Active Voice & Passive Voice
7. Infinitives & Gerunds
8. Conditionals
9. Collocations
10. American and British words

**TEXT BOOKS**

1. Sivananda, Sri Swami. *Stories from the Mahabharata*. Tehri-Garhwal, Himalayas: The Divine Life Society, 1984.
2. Bhasa. *Urubhangam: One Act Play*. Samskrita Sahitya Sadana, 1967



CC203	OBJECT ORIENTED PROGRAMMING WITH C++	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

## OBJECTIVES

- To help the students to get detailed Knowledge of the OOPS concepts using C++ Language.

## OUTCOMES

After completion of the course the students are expected to be able to:

- Design, implement, test, debug, and document programs that use OOPS concepts using C++

## SYLLABUS

UNIT – I Principles of Object Oriented Programming (OOP) - Software Evaluation - OOP Paradigm - Basic Concepts of OOP - Benefits of OOP - Application of OOP.

UNIT – II Introduction to C++ - Tokens - Keywords - Identifiers - Variables - Operators - Manipulators - Expressions and Control Structures - Pointers - Functions - Function Prototyping – Parameters Passing in Functions - Values Return by Functions.

UNIT – III Classes - objects - this pointer - constructor - destructor - inline function - friend function - scope resolution operator – operator overloading and Type Conversations.

UNIT – IV Inheritance - Types of Inheritance - Constructors in inheritance - virtual base classes – Virtual functions and Polymorphism - abstract classes – templates.

UNIT – V Files - I/O streams - manipulators - files - writing and retrieving objects from files.

## TEXT BOOK

1.Herbert Schildt , ‘The Complete Reference C++, McGraw Hill Education, 4<sup>th</sup> Edition 2003, Reprint 2017.

## REFERENCE BOOKS

1.Robert Lafore, ‘Object Oriented programming Using C++’, Waite’s Group Sams Publishing, 4<sup>th</sup> Editon, 2001.

2.E. Balaguruswamy, ‘ Programming in C++’, 5th Edition Tata Mcgraw Hill Education Private Limited (2011) .

<b>CC214</b>	<b>PRINCIPLES OF INFORMATION TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

### **OBJECTIVES**

- To study the fundamentals of computers, Input, output devices and storage Medias.
- To understand the concept of Operating Systems and Networks
- To understand the concept of Network Security and Internet Access

### **OUTCOMES**

After completion of the course the students acquire

- Knowledge about functionalities of computers.
- Knowledge about input, output devices and storage Medias.
- Knowledge about Operating systems .
- Knowledge about networking concepts.

### **SYLLABUS**

#### **UNIT – I**

Introduction to computers – Classification of digital computers – Anatomy of a digital computers – Memory units – Auxiliary storage devices – Input devices – output devices

#### **UNIT – II**

Introduction to Operating Systems –Functions of operating systems –Classification of operating systems –Generation of Programming Languages – Introduction to DBMS – Types of Database management systems.

#### **UNIT – III**

Data Processing: File Processing – Database Processing – Introduction to Computer Networks – Communication processors – Communication media – Telecommunication software – LAN-WAN- Network topologies: Star Network –Ring Network –Bus Network – Introduction to Distributed Data Processing – Distributing the processing and storage functions –Advantages and Disadvantages of distributed systems.

#### **UNIT – IV**

Introduction to computer security- Types of computer crimes – computer security –computer crime by authorized users and unauthorized access – Introduction to cryptography-Digital ciphers: DES -Code breaking – Applications and limits of encryption – introduction to computer viruses, bombs and worms –Characteristics of virus –categories of virus – virus vaccines.

## **UNIT – V**

Internet and World wide web : Internet Access – Internet protocols – Internet Addressing – Web browsers – Searching the web – Internet Chat –Electronic mail — computers as information tools for management control.

### **TEXT BOOK**

1. Alexis Leon, Mathews Leon, 'Introduction to computers', 1999, Reprint 2012, , Leon Press, Chennai.

### **REFERENCE BOOKS**

1. Alexis Leon ,Mathews Leon, 'Fundamentals of Information Technology', Leon Press, Chennai, 1999, Reprint 2012 .
2. Jaiswal, S. 'Fundamentals of Information Technology for BCA', Galgotia Publications, New Delhi,1999.
3. Curtin, P.D., Foley, K. and Morin C. 'Information Technology – The Breaking Wave', Tata McGraw Hill Publication Company, New Delhi, 2005.

CM205	COMPUTER ASSOCIATED NUMERICAL METHODS	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science), B.C.A.]

## OBJECTIVES

- To study the fundamentals of numerical methods.
- To understand the concept of solving simultaneous Algebraic Equations, Interpolation, numerical differentiation and integration.
- To understand the concept numerical solutions of differential equations.

## OUTCOMES

After completion of the course the students acquire

- Knowledge of fundamentals of numerical methods.
- Learn to solve simultaneous Algebraic Equations, problems of Interpolation, numerical differentiation and integration.
- Learn to solve differential equations numerically.

## SYLLABUS

**UNIT I: ITERATIVE METHODS**-Introduction - Beginning an iterative method - The method of successive bisection - The method of False position - Newton Raphson Iterative method - Secant method - The Method of successive approximation .

**UNIT II: SOLUTION OF SIMULTANEOUS ALGEBRAIC EQUATIONS**-Introduction – Direct methods of solution – Gauss elimination method , Gauss – Jordan method , Crout’s method – Iterative methods of solution – Jacobi’s method , Gauss – Seidal method – Solution of non-linear simultaneous equations – Newton–Raphson method – Determination of eigen values by iteration.

**UNIT III: INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION**-Finite differences – Newton’s interpolation formulae – Interpolation with unequal intervals – Lagrange’s formula ; Newton’s divided difference formula – Inverse interpolation – Numerical differentiation – Maxima and Minima of Tabulated functions - Numerical integration – Trapezoidal rule; Simpson’s 1/3<sup>rd</sup> rule ; Simpson’s 3/8<sup>th</sup> rule.

**UNIT IV: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**-Introduction – Picard’s method – Taylor’s series method – Euler’s method – Modified Euler’s method – Runge’s method – Runge-Kutta method – Predictor-corrector method ;Milne’s method.

**UNIT V: NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS**-Introduction – Classification of second order equations – Finite difference approximation to

derivatives – Elliptic equations – Solution of Laplace’s equation – Solution of Poisson’s equation – Parabolic equations – Solution of heat equation – Hyperbolic equations – Solution of wave equation.

**TEXT BOOKS:**

- 1.V.Rajaraman, Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd.,
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi

**REFERENCE BOOKS**

1. Ward Chenny, David Kincaid, Numerical Mathematics and Computing, Brookes and Cole Publishing Company
2. C. Xavier, C Language and Numerical Methods, New Age International Publishers

<b>CC216</b>	<b>OOPS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### **OBJECTIVES**

- To impart the basic concepts of Object oriented programming and be able to get trained in programming skills using C++

### **OUTCOMES**

- Students will be familiar in programming in C++ with OOPS concepts

### **LIST OF EXERCISES**

1. Fibonacci series using classes and object.
2. a) Prime no using constructor  
b) Factorial no using copy constructor  
c) Constructor overloading
3. Mean value using friend function
4. Program to implement Inline function
5. Student details using array of objects.
6. Complex Number using Object as Argument
7. Program to implement Function Overloading
8. Program to implement Static Function
9. Program to implement Unary Operator Overloading
10. Program to implement Binary Operator Overloading
11. Program to implement Multiple Inheritance
12. Program to implement This Pointer
13. Program to implement Virtual Function

CC207	VALUE EDUCATION	L	T	P	C
		1	0	0	1

[Common for B.Sc.(Computer Science), B.C.A. ]

**Unit I:** Value education-its purpose and significance in the present world – Value system – The role of culture and civilization-Holistic living – Balancing the outer and inner – Body, Mind and Intellectual level- Duties and responsibilities.

**Unit II :** Salient values for life- Truth, commitment, honesty and integrity, forgiveness and love, empathy and ability to sacrifice, care, unity , and inclusiveness, Self esteem and self confidence, punctuality – Time, task and resource management – Problem solving and decision making skills- Interpersonal and Intra personal relationship – Team work – Positive and creative thinking.

**Unit III:** Human Rights – Universal Declaration of Human Rights – Human Rights violations – National Integration – Peace and non-violence – Dr. A P J Kalam’s ten points for enlightened citizenship – Social Values and Welfare of the citizen – The role of media in value building.

**Unit IV :** Social Evils – Corruption, Cyber crime, Terrorism –Alcoholism, Drug addiction – Dowry – Domestic violence – untouchability – female infanticide – atrocities against womenHow to tackle them.

**Unit V:** MIND CULTURE -Mind Culture (Kural 457) Life and Mind - Bio - magnetism, Universal Magnetism (God –Realization and Self Realization) - Genetic Centre – Thought Action – Short term Memory – Expansiveness – Thought – Waves, Channelising the Mind, Stages - Meditation (Kural 261, 266, 270), Spiritual Value (Kural 423)

#### REFERENCE BOOKS:

1. M.G.Chitakra: Education and Human Values, A.P.H.Publishing Corporation, New Delhi, 2003
2. Chakravarthy, S.K. : Values and ethics for Organizations: Theory and Practice, Oxford University Press, New Delhi , 1999.
3. Satchidananda, M.K.: Ethics, Education, Indian Unity and Culture, Ajantha Publications, Delhi,
4. Das, M.S. & Gupta, V.K. : Social Values among Young adults: A changing Scenario,.
5. Bandiste, D.D.: Humanist Values: A Source Book, B.R. Publishing Corporation, Delhi, 1999
6. Ruhela, S.P. : Human Values and education, Sterling Publications, New Delhi, 1986
7. Kaul, G.N.: Values and Education in Independent Indan, Associated Publishers, Mumbai, 1975
8. NCERT, Education in Values, New Delhi, 1992

9. Swami Budhananda (1983) How to Build Character A Primer : Ramakrishna Mission
10. A Cultural Heritage of India (4 Vols.), Bharatiya Vidya Bhavan, Bombay
11. For Life, For the future : Reserves and Remains –UNESCO Publication
12. Values, A Vedanta Kesari Presentation, Sri Ramakrishna Math, Chennai, 1996
13. Swami Vivekananda, Youth and Modern India, Ramakrishna Mission, Chennai
14. Swami Vivekananda, Call to the Youth for Nation Building, Advaita Ashrama, Calcutta
15. Awakening Indians to India, Chinmayananda Mission, 2003
16. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004 (for All Units)
17. Thirukkural(Tamil).



LE302	ENGLISH - III	L	T	P	C
		2	2	0	3

[Common for B.Sc.(Computer Science), B.C.A.]  
(For Students admitted from 2017 onwards)

**OBJECTIVES:**

- Introducing students to other genres of literature.

**UNIT – I Poetry**

Maitreem Bhajata: A Benediction - Maha Periyava  
 Universal Prayer - Swami Sivananda  
 Where the Mind is Without Fear - Rabindranath Tagore

**UNIT - II Stories that foreground Indian Culture**

Truth at any cost  
 Character, not caste, makes for Superiority  
 Man, the master of his destiny

**UNIT - III One Act Play**

Karnabharam - Bhasa

**UNIT - IV Vocabulary**

**UNIT - V Modes of Communication**

1. Writing
2. Degrees of Comparison
3. Factual Writing

All these to be taught from exercises given after the end of each lesson

**TEXT BOOK**

- <http://www.acharya.gen.in:8080/maitreem.php>
- <https://www.sivananda.eu/en/meditation/the-4-yoga-paths/universal-prayer.html>

CC313	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		2	2	0	3

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To study Theory and problems related to *computer graphics*, computer *graphics* algorithms like line drawing, circle drawing and 2D and 3D transformation and also to introduce *basic concepts on Multimedia*.

### OUTCOMES

- At the end of this course students should have a basic understanding of the core concepts of computer graphics and Multimedia.

### SYLLABUS

**UNIT – I** Overview of graphics systems: Video display devices – Raster-scan systems – Random-scan systems – Graphics monitors and workstation – Input devices – Hard-copy devices – Graphics software.

**UNIT – II** Output primitives: Points and lines – Line-drawing algorithms – Circle generating algorithms – Attributes of output primitives: Line attributes – Curve attributes – Color and Grayscale levels - Area-fill attributes – Character attributes – Bundled attributes.

**UNIT – III** Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Other transformations – Two dimensional viewing – Viewing pipeline – window-to-viewport coordinate transformation - Three dimensional concepts – translation – rotation – scaling – shears

**UNIT – IV** Introduction to Multimedia –Components of Multimedia – Sound – Image – Text, hypertext – hypermedia – Applications of Multimedia

**UNIT – V** Animation : Animation techniques – Morphing – Video – Compression - Virtual Reality

### TEXT BOOKS

- Donald Hearn, M.Pauline Baker, Computer graphics - C Version, Second Edition, Pearson, Sixteenth Impression, 2012.  
Unit – I (Chapter 2)  
Unit – II (Chapter – 3 : 3.1, 3.2, 3.5, Chapter – 4 : 4.1 to 4.6)  
Unit – III (Chapter 5.1 to 5.4, Chapter 6.1 to 6.3, Chapter 9.1, 9.2, Chapter 11.1 to 11.4)
- Anirban Mukhopadhyay, Arup Chattopadhyay, Introduction to Computer Graphics and Multimedia, Second Edition, Vikas Publishing House PVT Ltd., 2009.  
Unit – IV & V (Chapter 9).

### REFERENCE BOOKS

- Ranjan Parkekh, Principles of Multimedia, McGraw Hill Pvt Ltd. Thirteenth Reprint, 2011.

<b>CC314</b>	<b>RELATIONAL DATA BASE MANAGEMENT SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

## OBJECTIVES

- To understand the different database models and language queries to access databases.
- To understand the normalization forms in building an effective database tables
- To protect the data and the database from unauthorized access and manipulation

## OUTCOMES

After completion of the course the students acquire knowledge to

- Define, manipulate, and control a relational database management system
- Build a database management system that satisfies relational theory
- Design SQL based applications

## SYLLABUS

UNIT – I Database – Database Management Systems – Benefits of DBMS – Levels of Abstraction – Database Models – Database Design: Entities – Attributes – Entity Sets – Relationship – Keys – ER Diagram

UNIT – II Introduction to RDBMS – Codd’s Rules for DBMS – Normalization – First Normal Form – Keys and Functional Dependencies – Second Normal Form – Third Normal Form – BCNF.

UNIT – III Introduction to SQL – SQL Query Language – Data Types – Operators – DDL Commands: Create – Delete – truncate – drop. DML Commands: Insert – Delete – Update. DCL Commands: Grant – Revoke. Built-In Functions: Numeric – String – Aggregate – Date and Time – Miscellaneous Functions.

UNIT – IV Interactive SQL Statements: Group By – Having – In Statement – Sub-queries. Join statements: Inner join – Outer join – Cross join – Self Joins. Set Operations: Union – Intersect – Minus.

UNIT – V PL/SQL – PL/SQL Block – Data Types – Control Structures – Procedures – Functions – Cursor: Implicit Cursor – Explicit Cursor – Trigger

## **TEXT BOOKS**

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6<sup>th</sup> Edition, McGraw-Hill, 2010 .... (Unit – 1)
2. Ivan Bayross, SQL, PL/SQL The Programming Language of ORACLE, 4<sup>th</sup> Revised Edition, BPB Publications 2009 ... (Unit – 2 to 5)

## **REFERENCE BOOKS**

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, 3<sup>rd</sup> edition, McGraw-Hill 2003
2. Date, C.J., An Introduction to Database Systems, 8<sup>th</sup> Edition, AddisonWesley, 2004.

<b>CC315</b>	<b>DATA STRUCTURES AND ALGORITHMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To understand the types of data structures namely Arrays, Linked list, Stack, Queue and trees with examples and implementation
- To understand the basic sorting and searching techniques.

### OUTCOMES

- After completion of the course the students acquire knowledge of basic data structures with their operations and implementations.

### SYLLABUS

**UNIT – I** Definition of a Data structure - primitive and composite Data Types- Asymptotic notations. Arrays- Operations on Arrays.

**UNIT - II** Sorting - Bubble sort - Insertion sort - Selection sort - Quick sort - Merge sort - Searching - Linear search - Binary search.

**UNIT - III** Stacks – Operations on Stack-Applications of Stack - Infix to Postfix Conversion, Recursion, - Queues - Operations on Queues, Circular Queue.

**UNIT - IV** Introduction to single and double Linked lists - Representation – operations on single linked list - Linked stacks and queues

**UNIT - V** Trees - Binary Trees - Memory representation - Traversal algorithms - - Binary search trees - Graph - Definition, Types of Graphs, Graph Traversal – BFS and DFS.

### TEXT BOOK

1. Seymour Lipschutz Theory and Problems of Data Structures, Tata Mc.Graw Hill First Edition, Reprint 2013

### REFERENCE BOOKS

1. E.Horowitz and S. Shani Fundamentals of Data Structures in C++, Galgotia Pub. 1999, E-book 2012.
2. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998, reprint 2008.
3. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PHI, 2<sup>nd</sup> Edition, 1997.

CC306	FUNDAMENTALS OF ACCOUNTING	L	T	P	C
		3	2	0	4

## OBJECTIVES

- To introduce the basic concepts and processes used to determine product costs and to evaluate information for cost ascertainment, planning, control and decision making.

## OUTCOMES

- Understand the role of different branches of accounting i.e. Financial Accounting, Cost Accounting and Management Accounting and able to understand the balance sheets of a Company under Company's Act, Banking Company and Insurance Company.

## SYLLABUS

**UNIT – I** Meaning and definition of accounting – Basic accounting concepts and convention – objectives of accounting – groups interested in accounting information – double entry system – kinds of accounts – journal and ledger accounts – subsidiary books .

**UNIT – II** Trial balance – meaning and preparation of trial balance – classification of errors – rectification of errors – suspense account – preparation of final accounts (simple problems with adjustments viz., closing stock, outstanding expenses, prepaid expenses, provision for depreciation , provision for doubtful debts)

**UNIT – III** Cashbook – simple cashbook – double column cashbook – triple column cashbook ( simple problem only) – analytical petty cashbook – bank reconciliation statement

**UNIT – IV** Depreciation – meaning – causes – methods of providing depreciation – straight line method – diminishing balance method Single entry system – meaning – features of single entry system – distinction between single entry and double entry system – statement of affairs method – conversion method (simple problems only )

**UNIT – V** Partnership accounts :meaning of partnership firm – merits and limitations of partnership – Partnership deed – fixed and fluctuating capital – final accounts of firms – admission and retirement of a partner – death of a partner– dissolution of partnership (simple problems only)

### Texts and Reference:

- Gupta R . L Advanced Accountancy, S . Chand – New Delhi
- S.P jain and K . L . Narang –Financial Accounts
- M.C.Shukla and T .S . Grawel – advanced accounts ( volume I )
- T. S. Reddy and A . Murthy – Financial accounting 2003 Margham publications

CC307	RDBMS LAB	L	T	P	C
		0	0	6	3

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To give practical training in design and implementation of relational data bases for the selected set of problems.

### OUTCOMES

- Students will be familiar in coding with PL/SQL programs and work with RDBMS

### LIST OF EXERCISES

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS. Sub-queries and JOINS
3. PL/SQL program for inserting record into employee table.
4. PL/SQL program for selecting records from employee table whose name begin with 'a'
5. PL/SQL block to generate EVEN, ODD numbers less than n using any one looping statement.
6. PL/SQL program to display employee names from employee able, those who are in deptno 10 using cursor.
7. PL/SQL Program to Raise an Application Error when the Employee Salary is Greater than 3000 using Employee Table.
8. PL/SQL program to copy the content of one Table to another Table.
9. PL/SQL program to find the biggest of two numbers using function.

<b>CC308</b>	<b>BASICS OF ENVIRONMENTAL SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

### **UNIT - 1 Introduction to environment and environmental studies**

1.1. Introduction to environment – components – nature of environment - need of awareness –reasons for environmental problems – anthropocentric and eco centric views.

1.2. Environmental studies - multidisciplinary nature – scope and aim – sustainable development- principles – RRR concept-Indian environmental movements – environmental calendar.

### **UNIT – II Ecosystem and Biodiversity**

2.1. Ecosystem – structure – functions – simplified ecosystem models (food chain and food webs and their types,energy flow) - forest – grassland – pond –ecosystems – ecological succession - ecological pyramids – Bio-geochemical cycles of water – oxygen-carbon-phosphorous and sulphur.

2.2. Biodiversity – definition – types – species – genetic and ecosystem diversities- values of biodiversity – threats to biodiversity – conservation of biodiversity – endemism – biodiversity hotspots – Indian biodiversity– endemic species of India – IUCN lists -red-green and blue data books.

### **UNIT - III Natural resources**

3.1 Natural resources – definition – types – forest resources – uses –deforestation- reasons - effects –water resources – dams – effects of dams - food resources – modern agriculture– ill effects -energy resources- types – hydel –nuclear – solar –wind and biomass energy - world scenario – Indian scenario.

3.2 Population and environment – reasons for over exploitation of resources – population – demography – population curves – population explosion – effects – consumerism – effects – urbanization – reasons and effects- role of an individual.

### **UNIT - IV Environmental Pollution**

4.1 Pollution – definition – types – air pollution – causes and effects – effects of CO<sub>2</sub> – CO – NO<sub>x</sub> –SO<sub>x</sub> – particulates – control of air pollution – water pollution – causes – effects – remedies – soil pollution – solid waste management – e waste – ill effects of e-waste – proper recycling-



Noise pollution – reasons – effects – control – nuclear pollution – cases – effects and control – thermal pollution causes – effects and remedies.

4.2 Legal provisions for protecting environment – article 48 A – 51 A (g) – Environment act 1986 – Air act 1981 – Water act 1974 – wild life protection act – Forest act 1980- problems in implementation–reasons.

#### **UNIT - V      Social issues and environmental ethics**

5.1 Present environmental scenario – green house effect – climate change – The Kyoto Protocol – ozone layer depletion-The Montreal Protocol - acid rain – causes – effects - disparity among the nations – The Copenhagen UNFCCC summit – carbon currency- virtual water- genetically modified organisms, Disaster management.

5.2 Environmental ethics – introduction – people getting affected - resettlement and rehabilitation – issues involved –Sardhar Sarovar project – Tawa Matsya sang - Melting icebergs of Arctic.

#### **TEXT BOOK**

1. Anubha Kaushik and C.P. Kaushik, "Prospects of Environmental Science", New Age International publishers, 2013.

#### **REFERENCE BOOKS**

1. Environmental Studies, N. Nandini, N. Sunitha and Sucharita Tandon, Sapna Book House, 2007.
2. Text book of Environmental Science, Ragavan Nambiar, Scitech Publications, 2009.
3. Text book of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chand and Co., 2002.
4. Environmental Chemistry, Colin Baird, W.H.Freeman and company, New York,1999
5. Environmental Chemistry, Gary W. VanLoon and Stephen J.Duffy, Oxford University Press, 2000.
6. New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai, Anamaya Publishers, 2006.

<b>LE402</b>	<b>ENGLISH - IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

**[Common for B.Sc.(Computer Science), B.C.A.]**

(For Students admitted from 2017 onwards)

**Objectives:**

- Students get introduced to real life situations and language to be adopted in communication.

**UNIT – I** : Letter Writing

**UNIT – II** : Comprehension

**UNIT – III** : Report Writing

**UNIT – IV** : Dialogue Writing

**UNIT – V** : Group Discussion

<b>CC413</b>	<b>COMPUTER SYSTEM ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

## OBJECTIVES

- To learn the basics of computer architecture which include CPU, I/O and Memory.

## OUTCOMES

- After completion of the course the students acquire knowledge of basics of computer architecture.

## SYLLABUS

**UNIT – I      Instruction Codes** – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input – Output and Interrupt .

**UNIT – II      Central processing unit:** General register organization – Stack organization – Instruction formats – Addressing modes.

**UNIT – III      Computer Arithmetic:** Addition - subtraction – Multiplication – Division Algorithms.

**UNIT – IV      Input – Output organization:** Peripheral devices – Input /Output interfaces – modes of transfer – Direct Memory Access (DMA).

**UNIT – V      Memory organization:** memory hierarchy – main memory – Auxiliary memory – Associative memory – Cache memory.

## TEXT BOOK :

1. Computer System Architecture – M.Morris Mano,Pearson India, Third Edition,2007.

CC414	JAVA PROGRAMING	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To learn JAVA programming concepts and implement the same

### OUTCOMES

- After completion of the course the students will be able to write programs using JAVA.

### SYLLABUS

**UNIT – I An overview of Java** - Data Types, Variables and Arrays – Operators – Control statements –**Introducing classes** – class fundamentals, declaring objects, methods, constructors, this keyword, garbage collection and finalize method

**UNIT – II Inheritance** –Inheritance basics, using super, creating a multilevel hierarchy, method overriding dynamic method dispatch, using abstract classes and using final with inheritance. **Packages** - Access protection, importing packages. **Interface** –defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

**UNIT – III Exception Handling** – Concepts of exception handling, Exception types, uncaught exceptions, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. **String Handling** – Special String operations, Character Extraction, String Comparison, Modifying a string and String Buffer.

**UNIT – IV Multithreading** – Java thread model, thread priorities, synchronization, creating threads, creating multiple threads, inter-thread communication. **Java I/O Streams** – Stream classes, Byte Streams, Character Streams and Serialization

**UNIT – V Applets** – Applet Basics, Applet architecture, Applet skeleton, Applet initialization and termination, simple applet display methods, simple banner applet, creating applets, passing parameters to applets. **Event Handling** - Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes.

### TEXT BOOK

1.Herbert Schildt, JAVA The Complete Reference – McGraw-Hill, 7th Edition 2007, New Delhi .

### REFERENCE BOOK

- Horstmann S, Gary Cornell (2013), Core Java 2 volume 2 - Advanced Features- PRENTICE HALL, 9th Edition, 2013, New Delhi.
- K. Somasundaram, Advanced Programming in Java 2: Updated to J2SE6 with Swing, Servlet and RMI: 1 Paperback – Jaico Publishing House; First edition 2008

CC415	COST AND MANAGEMENT ACCOUNTING	L	T	P	C
		3	2	0	4

### OBJECTIVES

- To learn basics of Cost and management accounting.
- To introduce the basic concepts and processes used to determine product costs and to evaluate information for cost ascertainment, planning, control and decision making.

### OUTCOMES

- Understand the role of different branches of accounting i.e. Financial Accounting, Cost Accounting and Management Accounting and able to understand the balance sheets of a Company under Company's Act, Banking Company and Insurance Company.

### SYLLABUS

**UNIT I COST ACCOUNTING** : Definition, Meaning and objectives – elements of cost and preparation of cost sheet and tender – difference between cost and financial accounting – management accounting – definition, meaning and objectives – distinction between management accounting and financial accounting.

**UNIT II MATERIAL** : Stores records – purchase order – Goods received . Note – Bin card – stores ledger – inventory control ,ABC analysis – Economic Ordering Quantity – maximum , minimum and reordering levels – methods of pricing issued . **LABOUR** : Importance of labour cost control – various methods of wage payment – calculation of wages – method of incentive schemes.

**UNIT III OVER HEADS** : Factory , administration ,selling and distribution overheads – classification – allocation and apportionment and redistribution ( secondary distribution ) – absorption of overhead including “Machine hour rate “

**UNIT IV FUND FLOW AND CASH FLOW ANALYSIS** : Financial statement analysis and interpretation – tools – funds flow analysis , cash flow analysis – differences between funds flow and cash flow analysis – ratio analysis – importance, use and limitation of ratio analysis – classification of ratios – profitability, turnover , solvency ratios

**UNIT V MARGINAL COSTING** : Marginal costing concepts – break even analysis – different types of problems(decision making) budgetary control – meaning – importance – uses – preparation of different types of functional budgets including flexible budget

### RECOMMENDED TEXTS AND REFERENCE

1. Iyengar S.P Cost accounting , principles and practice, Sultan Chand & Sons 2005
2. Prasad N. K Cost accounting Principles and problem Book Syndicate Pvt. Ltd., Kolkata 2015
3. Agarwal M Theory and practices of cost accounting
4. Maheswari S. N principles of management accounting, Sultan Chand & Sons 2014

<b>CC417</b>	<b>JAVA PROGRAMMING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]  
(For Students admitted from 2017 onwards)

### **OBJECTIVES**

- To Learn the basic concepts & techniques of Programming in JAVA

### **OUTCOMES**

- Understand the object-oriented approach in programming better.
- Able to analyze and design a computer program to solve real world problems based on object-oriented principles.

### **LIST OF EXERCISES**

1. Program to illustrate the concept of class and objects.
2. Program to illustrate the concept of method overloading.
3. Program to illustrate the concept of constructor overloading.
4. Program to illustrate the concept of Multiple Inheritance using interface.
5. Program to illustrate the concept of Exception handling.
6. Program to illustrate the concept of packages.
7. Program to illustrate the concept of multithreading.
8. Program to illustrate the concept of String and StringBuffer.
9. Program to illustrate the concept of Graphic function using an applet.
10. Program to perform the basic arithmetic operation using Event handling in an Applet.

<b>CC418</b>	<b>ENGLISH – COMMUNICATIONS SKILLS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

Course Objectives:	To build the listening, speaking, reading, and writing skills in English.
Course Outcome:	To improve spoken and written communication skills as a foundation to meet the job market

The purpose is to train the students in Reading, Writing and Speaking.

CC511	WEB TECHNOLOGY	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

## OBJECTIVES

- To understand and practice markup language
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side

## OUTCOMES

After completion of the course the students will

- Acquire knowledge about functionalities of world wide web.
- Explore markup languages features and create interactive web pages using them.
- Learn and design Client side validation using scripting languages.
- Acquire knowledge about Open source JavaScript libraries.
- Be able to design front end web page and connect to the back end databases.

## SYLLABUS

**UNIT – I** Internet Basics – introduction to HTML – HTML Elements –Common Tags and attributes –special characters in html –ordered list and unordered lists-Image Tag – Linking Documents – Image Maps – Tables – working with Frames – workings with Forms.

**UNIT – II** DHTML – Cascading Style sheet – Advantages of CSS –Including CSS in HTML – Background properties - BOX Properties – Font Properties – Text Properties – Class Selector – ID as selector –Span and DIV Element.

Introduction to JavaScript –advantages of JavaScript –syntax – JavaScript placement in HTML File – Data types and literals – variable – Array – Operators and expressions.

**UNIT – III** JavaScript programming constructs – Conditional structures – Loop statements - Functions in JavaScript - Dialog boxes in JavaScript. JavaScript objects – Browser object – window object – document object – Handling Events – Form object – HTML form elements – properties methods and events – String object – Math Object – Date Object.

**UNIT – IV** Introduction to ASP.NET – ASP.NET 4 page directives – ASP.NET page events – Dealing with postbacks – cross page posting - ASP.NET application folder – Compilation - ASP.NET server controls – Types of server controls – building with server controls – HTML Server controls . ASP.NET Web server controls : - label server control – literal server control – textbox server control –button server control –linkbutton server control – imagebutton server



control –hyperlink server control – dropdownlist server control – listbox server control – checkbox server control –checkboxlist server control –radiobutton server control – radiobuttonlist server control – image server control –Table server control –Calendar server control – Adrotator server control –imagemap server control –chart server control .

**UNIT- V** Validation server controls – understanding validation – client-side versus server – side validation – ASP.NET validation server controls – Required field validator – compare validator – range validator – regular expression validator – custom validator- Data binding – Data source controls – SQL data source control – Access Data source control – LinqDataSource Control – using bound list controls with data source controls. Basic ADO.NET features - Basic ADO.NET Namespaces and Classes - Using the Connection Object - using the command object - Using the DataReader Object - Using DataAdapter - Using Parameters - Understanding DataSet and DataTable – Datalist server control – Listview Server control.

### **TEXT BOOK**

1. Ivan Bayross, Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI, BPB Publications , 2000.
2. Bill Evjen, Scott Hanselman, Devin Rader,Professional ASP.NET 4 in C# and VB, Wiley Publishing, Inc. 2<sup>nd</sup> Edition 2010.

### **REFERENCE BOOKS**

1. T.A.Powell, Complete Reference HTML , TMH 2002.
2. J.Jaworski, Mastering Javascript , BPB publications , 1999
3. Matt J. Crouch, ASP.NET and VB.NET Web Programming – Pearson Education , 2002.
4. Greg Buczek, ASP.NET Developers Guide, TMH 2002.
5. Dave Mercer, “ASP. NET A Beginner’s Guide”, Tata McGraw –Hill Pub. Company Ltd, 2002.
6. Kirk Allen Evans, Ashwin Kamanna, Joel Mueller, “XML and ASP.NET”, Pearson Education, 2002.

CC512	OPERATING SYSTEMS	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To help the students to get detailed Knowledge of the various functions which are being performed by the Operating System.

### OUTCOME

- After completion of the course the students are expected to acquire knowledge on operating systems and its functional performance

### SYLLABUS

**UNIT – I Introduction** - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs

**UNIT – II Process Concept** – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication - Threads – Overview – Threading issues

**UNIT – III CPU Scheduling** – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple- Processor Scheduling – Real Time Scheduling – The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

**UNIT – IV Deadlock** : System Model – Deadlock Characterization – Methods for handling Deadlocks – Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks – Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

**UNIT – V Virtual Memory** – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

### TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

## REFERENCE BOOKS

1. Harvey M. Deitel, "Operating Systems", Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd, 2003.
3. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.
4. Pramod Chandra P. Bhatt – "An Introduction to 7, Concepts and Practice", PHI, 2003

<b>CC503</b>	<b>VB .NET</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

## OBJECTIVES

1. To impart the knowledge on .Net Frame work and CLR.
2. To learn about creation of Console and Window application
3. To understand the web form creation and provide knowledge for creating websites

## OUTCOMES

After completion of the course the students are expected to

1. Understand .NET Framework and CLR.
2. Describe the basic structure of a Visual Basic.NET project.
3. Create applications using Microsoft Window Forms
4. Create applications that use ADO. NET
5. Create Reports Using Crystal Reports

## SYLLABUS

**UNIT – I** Introduction about the .NET Framework – Visual Studio Integrated Development Environment.Introduction to Vb.NET - VB.NET Fundamentals – Variables – Data Types – Arrays – Control Flow Statements – Function and Procedures.

**UNIT – II** Implementing OOPS in VB.NET - Classes – Constructors – Inheritance – Static classes – interfaces - Exception Handling – Collections – Arrays – Array list Collection – Handling Characters , Strings and Dates.

**UNIT – III** Building windows applications – Creating Windows Forms and Form Applications- Adding Controls and Handling Events – Mouse and Keyboard Events – Designing Menus – Building MDI Applications-Common Dialog Controls.

**UNIT – IV** Working with ADO.NET – Architecture - DataSet – DataGrid Control- Data Binding – Creating Window applications using ADO.NET- Creating Reports - File I/O Operations.

**UNIT – V** Introduction to Web Programming – Building Web Applications — Basic Server Controls –HTML Controls – Validation Controls - Simple Data binding – Binding to DataSets – Building database Applications.

## TEXT BOOKS

1. Steven Holzner, Visual Basic.Net, Black Book Series, Dreamtech Press, First Edition, 2005.

## REFERENCE BOOKS

1. Jeffery R. Shapiro , The Complete Reference Visual Basic .NET, Tata McGraw Hills, First Edition, 2002
2. Evangelos Petroustos, Ali Bilgin, “Mastering Visual Basic. NET Database Programming”, BPB Publications, First Edition, 2002.

CC515	WEB TECHNOLOGY LAB	L	T	P	C
		0	0	6	3

[Common for B.Sc.(Computer Science) and B.C.A. ]  
(For Students admitted from 2017 onwards)

### OBJECTIVES

- To develop an ability to design and implement static and dynamic website

### OUTCOME

- Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
- Have a good knowledge of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

### LIST OF EXERCISES

- Write a HTML code to demonstrate the Formatting the Text, Font, Image and List Tags.
- Write a HTML code to create a web page which includes a map and display the related information when a hot spot is clicked in the map.
- Write a HTML Code to design the class time table using table tags and to apply the styles.
- Write HTML code to develop college website using Frame elements.
- Write a JavaScript program to define a user defined function for sorting the values in an array.
- Write a JavaScript program to generate the Fibonacci series of the given number.
- Write a JavaScript program to find the factorial of the given number.
- Write a HTML Code to Design a simple calculator application
- Write a HTML Code to design a login form and validate it using JavaScript
- Write a HTML Code to design Registration form and validate it using JavaScript.
- Create an ASP.NET program to perform validation using validation controls.
- Create a program in ASP .NET to connect with the database using ADODB connectivity a manipulate the records.

CC506	VB .NET LAB	L	T	P	C
		0	0	6	3

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

#### OBJECTIVES

- To develop an ability to gain familiarity and ability to implement programs using .NET concept

#### OUTCOME

- Students are familiarized in developing simple applications using VB.NET.

#### LIST OF EXERCISES

1. Console Application to implement OOPS Concepts
2. Console Application to handle exceptions
3. Window Application to use various controls in vb.net
4. Window Application to use Common dialog Controls.
5. Window Application to create Notepad using Menu.
6. Window Application to perform input validations using procedure.
7. Window Application to perform file operations.
8. Window Application for Database connectivity using Ado.net.
9. Web Application to validate input using Validation Controls.
10. Web application to Connect with the database using ADO.NET

CC507	SKILLS FOR HUMAN RESOURCE DEVELOPMENT	L	T	P	C
		2	0	0	2

[Common for B.Sc.(Computer Science), B.C.A.]

**Objective:** The course is an attempt to provide our students with an overview on the various skills that would enable them to succeed in their personal and professional life.

The course would cover the following topics:

S.NO	TOPIC
01	Aptitude Skills
02	Reasoning Skills
03	Success and Competition
04	Self-awareness and Personality development
05	Inter personal skills
06	Time and Stress management
07	Motivation and leadership skills
08	Recruitment process

#### REFERNCES:

1. Quantitative Aptitude, Dr.R.S.Agarwal, S.Chand and Company private limited, New Delhi.
2. Test of Reasoning, Edgar Thope, Tata McGraw-Hill publishing Company Limited, New Delhi.
3. Personality Development, R.C.Bhatia, Ane Books private Limited, New Delhi.

CC611	COMPUTER NETWORKS	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES:

- To learn the of basics of Computer Networks.

### OUTCOMES

- After completion of the course the students are expected to Understand the basic concepts of Computer Networks.

### SYLLABUS

**UNIT – I** Introduction – Uses of Computer Networks-Network Hardware: LAN – WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – Reference Models: OSI Reference Model – TCP/IP reference Model – Comparison of OSI and TCP/IP

**UNIT – II** PHYSICAL LAYER - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves.

**UNIT – III** DATA LINK LAYER: Error Detection and correction – Elementary Data-link Protocols –Sliding Window Protocols.–Ethernet – Wireless LANs - Bluetooth.

**UNIT – IV** NETWORK LAYER: Routing algorithms – Congestion Control Algorithms. TRANSPORT LAYER: – Internet Transport Protocols: TCP.

**UNIT – V** APPLICATION LAYER: DNS – E-mail. NETWORK SECURITY: Cryptography – Symmetric Key Algorithms – Public Key Algorithms.

### TEXT BOOK

1. Andrew S. Tanenbaum, Computer Networks, 5th edition, PHI, 2013.

### REFERENCE BOOKS

1. Achyut Godbole, Data Communication And Networks, TMH 2007.
2. Uyles Black, Computer Networks Protocols, Standards, and Interfaces , PHI, 2nd ed, 1993, Digitized 2007.



<b>CC612</b>	<b>SOFTWARE ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

[Common for B.Sc.(Computer Science) and B.C.A. ]

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To provide an insight into the process of software development life cycle
- To inculcate knowledge on software engineering concepts in turn gives a roadmap to design a new software project

### OUTCOME

- Understand various phases of software development lifecycle
- Analyze the requirements systematically and develop the model
- Apply design concepts for the development of a complex software system
- Develop software testing strategies.

### SYLLABUS

UNIT – I Introduction : Nature of Software : Defining Software, Software Characteristics, Software Application domains, Generic process model, Software process models: waterfall model, prototype model, Increment model, Spiral model, RAD model, Win-Win model, Agile model

UNIT – II Understanding Requirements and Requirements Modeling : Requirements engineering, Software requirement specification, Requirement analysis, Data modeling, Flow oriented modeling, Behavioral modeling.

UNIT – III Design concepts: Design within the context of software engineering, Design process, Design concepts, Transform mapping, Transaction mapping, Design documentation.

UNIT – IV Design Model and methods : Design model, Architectural design, Designing traditional components, User interface analysis and design, Procedural design, Design for Real time systems

UNIT – V Software Testing :Software testing fundamentals, White box testing, Black box testing, A strategic approach to software testing, System testing.

### TEXT BOOK

1. Roger S.Pressman, “Software Engineering A Practitioners Approach”, 7<sup>th</sup> Edition, Tata McGraw Hill, 2010.

### REFERENCE BOOKS

1. Richard Fairley, Software Engineering Concepts – Tata McGraw Hill, 2010.
2. Wamans Jawadekar, Software Engineering Principles & Practices, Tata McGraw Hill, 2010.

CC613	PROGRAMMING WITH PYTHON	L	T	P	C
		3	2	0	4

[Common for B.Sc.(Computer Science), B.C.A.]  
(For Students admitted from 2017 onwards)

## OBJECTIVE

- To build programming logic and thereby developing skills in problem solving using Python programming language
- To be able to do testing and debugging of code written in Python Emphasize the concepts and constructs rather than on language features.

## OUTCOMES:

- Able to apply the principles python programming.
- Write clear and effective python code.
- Create applications using python programming.

**UNIT – I** Computer Systems - Python Programming Language Computational Thinking - Python Data Types - Expressions, Variables, and Assignments – Strings – Lists – Objects & Classes – Python standard library.

**UNIT – II** Imperative programming – Python modules – print() function –input() function– functional eval() – Execution Control Structures – user-defined functions python variables & assignments parameter passing.

**UNIT – III** Text Data, Files & Exceptions – Strings revisited – formatted output – files – errors & exceptions- Execution Control Structures – decision control & the IF statement -For Loop and Iteration Patterns - two-dimensional lists –while loop –Additional iteration control statements.

**UNIT – IV** Container and Randomness – Dictionaries – other built-in container types – character encodings & strings – module random. Namespaces – encapsulation in functions – global vs local namespaces -exceptional flow control – modules as namespaces- classes as namespaces.

**UNIT – V** Object oriented programming : Defining new python class – Examples of user defined classes – Designing new container classes – Overloaded operators –Inheritance – user defined Exceptions.

## Text Books:

Ljubomir Perkovic, “Introduction to Computing Using Python: An Application Development Focus”, John Wiley & Sons, 2<sup>nd</sup> Edition, 2012

## Reference Books

1. T. Budd, Exploring Python, TMH, 1st Edition, 2016
2. Allen B Downey, Think Python, O’Reilly Media, 1st Edition, 2016

CC615	SOFTWARE DEVELOPMENT LAB	L	T	P	C
		0	0	8	6

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

### **OBJECTIVES**

To Practice the different types of case tools such as Rational Rose / or any other Open Source for all the phases of Software development life cycle.

### **OUTCOMES**

Apply the following to typical application problems

1. Project Planning
2. Software Requirement Analysis
3. Software Design
4. Data Modeling & Implementation

**A possible set of applications may be the following**

- a. Library System
- b. Student Marks Analyzing System
- c. Text Editor.
- d. Create a dictionary.
- e. Telephone directory.
- f. Inventory System.

CC616	PYTHON LAB	L	T	P	C
		0	0	6	3

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

**LIST OF EXERCISES**

1. Write a Python Program to Convert Celsius to Fahrenheit and vice versa.
2. Write a Python Program to Calculate the Area of a Triangle, circle and square.
3. Write a Python Program to Solve Quadratic Equation
4. Write a Python Program to Generate a Random Number
5. Write a Python Program to Print the Fibonacci sequence
6. Write a Python Program to Find the Factorial of a Number
7. Write a Python Program to Check Armstrong Number
8. Write a Python Program to Check Prime Number
9. Write a Python Program to Check Whether a String is Palindrome or Not
10. Write a Python Program to Display the multiplication Table
11. Write a Python Program to Convert Decimal to Binary, Octal and Hexadecimal
12. Write a Python Program to Make a Simple Calculator
13. Write a Python Program to Add Two Matrices
14. Write a Python Program to Multiply Two Matrices
15. Write a Python Program to Transpose a Matrix

<b>ELECTIVE - I</b> <b>CC416</b>	<b>ORGANIZATIONAL BEHAVIOR</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To provide an overview of theories and practices in organizational behavior in individual, group and organizational level

### OUTCOMES

- Students will have a better understanding of human behavior in organization. They will know the framework for managing individual and group performance.

### SYLLABUS

**UNIT - I** Basic Concepts : Definition-nature and scope of Organizational Behavior- Need for studying Organizational Behavior, Model of Organizational Behavior (Aurocratic, custodial, supportive and collegial model)

**UNIT - II** Individual differences: Personality - concept, Determinants, types and theories of personality. Perception - Definition & process of perception: Factors affecting perception, Perception and its application in Organization Behavior

**UNIT - III** Motivation: Meaning, Nature & need of Motivation. Theories of motivation: Attitude – theories of attitude - Attitude change.

**UNIT - IV:** Communication: Nature, need, Process and channels of communication; effective communication; **leadership**: functions of leadership, leadership styles

**UNIT - V** Organizational Structure: Organizational Structure -Meaning, characteristics and types organization structure Organizational **culture**: meaning, types functions organizational change: Resistance to change & Managing Resistance to change.

### TEXT BOOKS

- Fred Luthens - Organizational Behaviour[chapters 1,4,5,6,7,&8], McGraw Hill Pub, 12<sup>th</sup> Edition 2011.
- Stephen P.Robbins – Essentials of Organizational Behaviour – Prentice Hall -6 th Edition, 2000.

<b>ELECTIVE - I</b> <b>CC426</b>	<b>Management Information System</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

(For Students admitted from 2017 onwards)

### OBJECTIVES

- To offer in depth knowledge on information systems in business and their management.

### OUTCOMES

- Better understanding of MIS improves planning and decision making in management

### SYLLABUS

**UNIT – I** Definition of MIS- Data Processing , Decision Support Systems – Information Resources Management , End user Computing Managerial Accounting , OR Management theory Sub Systems of MIS.

**UNIT – II** Data Base Query Languages, Report generators , Statistical Packages , Modeling Languages , V.H.L Language. Batch system, On Line system. Communication systems, Front End Processors, LAN , WAN , Distributed Systems.

**UNIT – III** Logical Data Concepts , Sequencing of Data , Types of Files , Data Bases .Serial Access and Direct Access devices. Sequential , Hashed and indexed File Organization – Data Base Organization – single flat File – Hierarchical , Network, Relational DB Structures. Transaction Processing – Control and Retrieval.

**UNIT – IV** Decision Making Process – Problem Formulation \_ programmed Vs Non Programmed Decision – Criteria for Decision Making , Classical Economical Model – Administrative Model – Resolution of Conflict – Uncertainty Avoidance – Problematic Search – Incremental Decision Making.

**UNIT – V** Hierarchy of planning – planning models – Computational support for planning – organizational structure Implementations and Management Theory in System Design – Decision Support systems and Expert systems – Computational support of intelligence.

#### TEXT BOOK

- GORDON B. DAVIS and MAGGRETHE H . OLSON , Management Information Systems , McGraw Hill International Edition - Second Edition , 1998, Digitized 2007

#### REFERENCE BOOK

- S.Sadagopan, Management Information Systems, PHI Learning 1997.

<b>ELECTIVE - II</b> <b>CC524</b>	<b>NETWORK SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

### **OBJECTIVES**

The objective of the course is to provide necessary foundations on issues related to network security and available security services and mechanisms like cryptography, firewall, antivirus software.

### **OUTCOME**

- Understand the concepts and foundations of computer security
- The different security goals and how they can be achieved by means of cryptography
- To identify vulnerabilities of IT systems.

### **SYLLABUS**

**UNIT – I** Introduction –Security attacks, Mechanisms and services - A model for Internet Security – Classical Encryption Techniques: Symmetric Cipher model, Substitution Techniques, Transposition Techniques, Steganography.

**UNIT – II** Block Cipher Principles – The Data Encryption Standard – Strength of DES – Block Cipher Modes of Operations –Key Distribution-Triple DES

**UNIT – III** Principles of public key cryptosystems – RSA Algorithm - Diffie Hellman Key Exchange Algorithm. Authentication-Secure Hash Functions and HMAC

**UNIT – IV** Email Security- Pretty Good Privacy - S/MIME. IP Security- IP Security Architecture.

**UNIT – V** System Security: Intruders, Viruses and Related Threats - Firewall Design Principles

### **TEXT BOOK**

1. William Stallings, “Network Security Essentials – Applications and Standards”, 4<sup>th</sup> Edition, Pearson Education, 2011

### **REFERENCE BOOK**

1. AtulKahate, “Cryptography and Network Security”, 3<sup>rd</sup> Edition, Tata McGraw-Hill, 2013.
2. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, 2015.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, 4<sup>th</sup> Edition, Pearson Education, 2007

<b>ELECTIVE - II</b> <b>CC514</b>	<b>E- COMMERCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

### **OBJECTIVES**

- To learn the impact of internet technology in electronic business and commerce.

### **OUTCOME**

- Understand the basic concepts and types of information systems.
- Develop an understanding of how various information systems work together to accomplish the information objectives of an organization

### **SYLLABUS**

**UNIT – I** Introduction – Electronic Commerce Framework – The Anatomy of E-Commerce Applications - The Network Infrastructure for E-Commerce - The Internet as a Network Infrastructure.

**UNIT – II** Electronic Commerce and World Wide Web – Architectural Framework – WWW as the Architecture – Web Background : Hypertext Publishing – Technology behind the Web – Security and the Web.

**UNIT – III** Electronic Payment Systems - Interorganizational Commerce and EDI - EDI Implementation, MIME and Value – added Networks.

**UNIT – IV** Advertising and Marketing on the Internet - Computer Based Education and Training - Technological Components of Education on-Demand - Digital Copy rights and Electronic Commerce.

**UNIT – V** The Corporate Digital Library – Dimensions of Internal Electronics Commerce Systems - Making a Business case for a document Library - Types of Digital documents - Issues behind document Infrastructure - Corporate data warehouses - Active / Compound document Architecture.

### **TEXT BOOK :**

1. Ravi Kalakota and Andrew B.Whinston, "Frontiers of Electronic Commerce", Addison Wesley, First Edition, 1996, Digitized 2007.

### **REFERENCES:**

1. Pete Loshin, Paul A. Murphy, "Electronic Commerce , II Edition", Jaico Publishers, 1996.
2. David Whiteley, "Electronic Commerce: Strategy, Technologies and Applications" - McGraw Hill, 2000.



<b>ELECTIVE - III</b> <b>CC614</b>	<b>CLOUD COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**[Common for B.Sc.(Computer Science) and B.C.A. ]**  
(For Students admitted from 2017 onwards)

**OBJECTIVES:**

- To understand Cloud Computing models and Services
- Virtualization – Compute, storage and Network
- Study on Security, Storage and applications

**OUTCOME:**

- Strong Foundations on Cloud Computing Model and services
- Virtualization concepts on compute, storage and network
- Security and Backup solutions for cloud based services

**SYLLABUS**

**UNIT – I** Cloud Computing : Definition – Cloud Types – Characteristics of Cloud Computing – Benefits of Cloud Computing – Disadvantages of Cloud Computing.

**UNIT – II** Cloud Architecture : Composability – Infrastructure – Platform. Services: Infrastructure as a Service – Platform as a service – Software as a Service

**UNIT – III** Virtualization Technology : Load Balancing and Virtualization – Understanding Hypervisors: Virtual Machine types – Vmware vSphere – Understanding Machine Imaging – Porting Applications

**UNIT – IV** Cloud Security : The security boundary – Security service boundary – security mapping. Securing the Data: Brokered cloud storage access – Storage location and tenancy – Encryption – Auditing and Compliance.

**UNIT – V** Applications in the cloud – Functionality mapping – Application attributes – Cloud service attributes – System abstraction – Cloud bursting.

**TEXT BOOK :**

1. Barrie Sosinsky, “Cloud Computing”, Wiley India Pvt. Ltd, 2011

**REFERENCE BOOK :**

1. Ronald L Krutz and Russell Dean Vines, “Cloud Security”, Wiley Publishing, 2010
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, “Mastering Cloud Computing”, McGraw Hill Education, 2013.
3. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing” Tata McGraw-Hill, 2012
4. Kris Jamsa, “Cloud Computing”, Jones and Bartlett Learning, 2014

<b>ELECTIVE - III</b> <b>CC614</b>	<b>DATA MINING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**[Common for B.Sc.(Computer Science) and B.C.A. ]**

(For Students admitted from 2017 onwards)

**OBJECTIVES:**

- To understand the principles of data mining techniques.

**OUTCOME:**

- Gain knowledge of preprocessing data, applying rule mining techniques, design and deploy appropriate classification techniques

**SYLLABUS**

**UNIT – I Introduction: Data mining:** Functionalities of Data Mining – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction

**UNIT – II Data Mining, Primitives, Languages and System Architecture:**

Data Mining – Primitives – Data Mining Query Language,.Architectures of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.

**UNIT – III Mining Association Rules:** Basics Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.

**UNIT – IV Classification and Prediction:** Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.

**UNIT – V Cluster Analysis:** Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods Density Based Methods – GRID Based Method – Model based Clustering Method.

**TEXT BOOKS**

1. J.Han and M. Kamber,2001,Data Mining Concepts and Techniques,Harcourt India Pvt. Ltd - New Delhi.
2. K.P. Soman ,ShyamDiwakar, V.Ajay ,2006, Insight into Data Mining Theory and Practice, Prentice Hall of India Pvt. Ltd - New Delhi.