

**A.VEERIYA VANDAYAR MEMORIAL  
SRI PUSHPAM COLLEGE (AUTONOMOUS)**

**POONDI-613 503, THANJAVUR (DT)**



---

**SYLLABUS**

***B.C.A.,***

**(From 2020 - 2021 onwards)**

---

## **Program Outcomes of B.C.A.**

At the end of the three year B.C.A programme the students will be able to :-

- Understand, analyse and develop computer programme in the areas related to algorithm, web design and networking for efficient design of computer-based system.
- Find career in the IT sector as system engineer ,software tester , junior programmer web developer ,system administrator ,software developer ,etc.,
- Apply standard software engineering practices and strategies in software project development using open-source programming environment to deliver a quality of product for business success.

## **Program Specific Outcomes of B.C.A.**

- ❖ On the completion of B.C.A programme the students will be able to equip themselves to provide any service in the IT industry.
- ❖ Students gain ability to use the core concepts of computing and optimization techniques to develop more efficient and effective computing mechanisms.
- ❖ Students acquire professionals, social, ethical, effective communication skills and entrepreneurial practice among their holistic growth.
- ❖ Students can develop technical and managerial skills needed to be an effective leader, an entrepreneur or in a software professional and recognize the need and engage in lifelong for professional growth.

**BCA (BACHELOR OF COMPUTER APPLICATIONS) – 2020 - 2021**

Sl. No.	Semester	Category	Course code	Title of the Course	Maximum marks			Minimum marks for pass			Hours/ week	Credits
					CIA	E.E	Total	CIA	E.E	Total		
1	<b>I</b>	Part I	20U1CAT1/H1	Tamil-I/Hindi –I	25	75	100	10	30	40	6	3
2		Part II	20U1CAE1	English-I	25	75	100	10	30	40	6	3
3		Core	20U1CAC1	Problem Solving using Python	25	75	100	10	30	40	7	6
4		Core	20U1CACP1	Lab-I Programming in Python Lab	40	60	100	16	24	40	3	3
5		Allied	20U1CAMAA1	Numerical Analysis and Statistical methods	25	75	100	10	30	40	5	3
		Allied	20U2CAMAA2	Discrete Mathematics (NS)	-	-	-	-	-	-	3	-
6		ES(SS)	20U1CAES	Environment Studies	-	100	100	-	40	40	-	1
7	<b>II</b>	Part I	20U2CAT2/H2	Tamil-II/Hindi –II	25	75	100	10	30	40	6	3
8		Part II	20U2CAE2	English-II	25	75	100	10	30	40	6	3
9		Core	20U2CAC2	C Programming and Data Structures	25	75	100	10	30	40	6	6
10		Core	20U2CACP2	Lab-II C Programming and Data Structures	40	60	100	16	24	40	3	3
11		Allied	20U2CAMAA2	Discrete Mathematics (N-S)	25	75	100	10	30	40	3	4
12		Allied	20U2CAMAA3	Operation Research	25	75	100	10	30	40	5	3
13		VBE	20U4CAVE	Value Based Education	25	75	100	10	30	40	-	-
14		SBE	20U2CAS1	Skill Based Elective - New Media – 1	25	75	100	10	30	40	1	2
15	<b>III</b>	Part I	20U3CAT3/H3	Tamil-III/Hindi –III	25	75	100	10	30	40	6	3
16		Part II	20U3CAE3	English-III	25	75	100	10	30	40	6	3
17		Core	20U3CAC3	Java Programming	25	75	100	10	30	40	7	6
18		Core	20U3CACP3	Lab-III Java Programming	25	75	100	10	30	40	3	3
19		Allied	20U3CABAA1	Organizational Behaviour	25	75	100	10	30	40	5	3
		Allied	20U4CABAA2	Organizational Dynamics Training lab (NS)	-	-	-	-	-	-	3	-
20		GS	20U3CAGS	Gender Studies	-	100	100	-	40	40	-	-
		Online	-	MOOC	-	-	-	-	-	-	-	-

Sl. No.	Semester	Category	Course code	Title of the Course	Maximum marks			Minimum marks for pass			Hours/ week	Credits
					CIA	E.E	Total	CIA	E.E	Total		
21	IV	Part I	20U4CAT4/H4	Tamil-IV/Hindi -IV	25	75	100	10	30	40	6	3
22		Part II	20U4CAE4	English-IV	25	75	100	10	30	40	6	3
23		Core	20U4CAC4	Database Management System	25	75	100	10	30	40	6	6
24		Core-PL	20U4CACP4	Lab IV - Database Management System and Accounting Package	40	60	100	16	24	40	3	3
25		Allied	20U4CABAA2	Organizational Dynamics Training lab	40	60	100	16	24	40	3	3
26		Allied	20U4CABAA3	Financial Accounting	40	60	100	16	24	40	5	4
27		SBE	20U4CAS2	Skill Based Elective - New Media – 2	25	75	100	10	30	40	1	2
		Online	-	MOOC	-	-	-	-	-	-	-	-
28	V	Core	20U5CAC5	Operating System	25	75	100	10	30	40	6	5
29		Core	20U5CAC6	Software Engineering	25	75	100	10	30	40	5	5
30		Core	20U5CAC7	Computer Networks	25	75	100	10	30	40	5	5
31		Core	20U5CACP5	Lab V- Operating System and Web Design	40	60	100	16	24	40	3	3
32		Major Elective-1	20U5CAEL1A/ 20U5CAEL1B	Digital Marketing / Management Information System	25	75	100	10	30	40	4	4
33		Major Elective-2	20U5CAEL2A/ 20U5CAEL2B	XML and Web Services/ Web Technology	25	75	100	10	30	40	4	3
35		NME	20U5CANME	Non Major Elective – Social Media Marketing	25	75	100	10	30	40	2	1
		Life Skill	20U5CALSD	Life Skill Development	40	60	100	16	24	40	1	-
36	VI	Core	20U6CAC8	Distributed Programming using .net	25	75	100	10	30	40	5	5
37		Core	20U6CAC9	Cloud Computing	25	75	100	10	30	40	5	5
38		Core	20U6CAC10	Basics of Big Data	25	75	100	10	30	40	6	6
39		Core	20U6CACP6	Lab VI - Distributed Programming using .net lab	40	60	100	16	24	40	4	3
40		Major Elective-3	20U6CAEL3A/ 20U6CAEL3B	Multimedia / Mobile Applications	25	75	100	10	30	40	5	4
41		Major Elective-4	20U6CAEL4PA/ 20U6CAEL4PB	Multimedia lab / Mobile Applications lab	40	60	100	16	24	40	3	3
42		GK	20U6CAGK	General Knowledge	-	100	100	-	40	40	1	-
43		CN	20U6CACN	Comprehensive test		100	100	-	40	40	1	1
		Extension Activity			-	-	-	-	-	-	-	1
		Total			4300						180	140

### Abbreviations

ESE: Environmental studies	LSD: Life Skill Development
VBE: Value Based Education	GK : General Knowledge
SBE: Skill Based Elective	NME: Non – Major Elective
GS: Gender Studies	EA: Extension Activities
CC:Certificate Course	SS: Self Study
MOOC-Massive Open Online Course	

### B.C.A. COMPUTER APPLICATIONS (2020 – 2021)

Paper Code	Total No. Of Papers	Total Marks	Total Credits	Classification
<b>Part – I</b>	<b>04</b>	<b>400</b>	<b>12</b>	√
<b>Part – II</b>	<b>04</b>	<b>400</b>	<b>12</b>	√
<b>Part – III</b> Core Allied Major Elective	16 06 04 <b>26</b>	1600 600 400 <b>2600</b>	76 20 14 <b>110</b>	√
<b>Part – IV</b> Environmental Studies Value based education Skill Based Elective Gender studies Non Major Elective Soft skill development G.K Comprehensive test	1 1 2 1 1 1 1 1 <b>1</b> <b>9</b>	100 100 200 100 100 100 100 100 <b>100</b> <b>900</b>	1 - 2 - 1 - - - <b>1</b> <b>05</b>	√
<b>Part – V</b>	<b>Extension Activity</b>		<b>1</b>	X
<b>Total</b>	<b>43</b>	<b>4300</b>	<b>140</b>	√

**Comprehensive Knowledge Test:** Objective type question pattern with 100 compulsory questions carrying 100 marks to be answered in 3 Hours with 2 credits. The portion is entire core courses.

**MOOC:** Massive open online course is introduced in the third and fourth semester as an extra credit course from this academic year 2020-2021. Students can avail any one or more of the courses available in MOOC to equip their skill and knowledge themselves.

**Field Visit / Industrial Visit / Hands on training programme** having minimum 15 hours of contact time as Extra Credit course is introduced for II-year UG students to gain experiential learning

Evaluation of the visit report will be held at the end of IV Semester.

Components of Evaluation

Internal Marks	40
----------------	----

External marks	60
----------------	----

Total	100
-------	-----

**Project** is introduced for III year students to cater for the needs of advanced learners as extra credit course

Components of Evaluation

Internal Marks	40
----------------	----

External marks	60
----------------	----

Total	100
-------	-----

**Soft skill development course** prescribed in V semester is changed as **Life Skill Development**.

This course will be handled by both Internal Staff and External Experts.

Mode of Assessment for this course is oral examination.

Components of Evaluation

Internal Marks	40
----------------	----

External marks	60
----------------	----

Total	100
-------	-----

**Skill Based Elective Offered by the Computer Application Department**

1. New Media 1

2. New Media 2

**Certificate Course Offered by the Computer Application Department:**

Understanding Information Technology Industry Process will be conducted for III UG students as an Extra Credit Course

MOOC online course - Extra Credit Course

**Non – Major Elective paper offered by the Computer Application Department**

Social Media Marketing

*BCA*

**A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE  
(AUTONOMOUS),  
POONDI, THANJAVUR DIST.**

**Question Pattern for UG and PG Programmes for students to be admitted  
during 2020 – 2021 and afterwards.**

**Total Marks: 75**

**QUESTION PATTERN**

**SECTION – A  
(Question 1 to 10)**

**10 x 2 = 20 Marks**

1. Short Answer Questions.
2. Two Questions from each unit (All are answerable)

**SECTION – B  
(Question 11 to 15)**

**5 x 5 = 25 Marks**

1. 5 Paragraph type questions with “either / or” type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

**SECTION – C  
(Question 16 to 20)**

**3 x 10 = 30 Marks**

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

## BCA

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
<b>I</b>	<b>20U1CAT1</b>	<b>இக்கால இலக்கியம்</b> (செய்யுள் , உரைநடை, சிறுகதை, புதினம், நாடகம் இலக்கிய வரலாறு)	<b>6</b>	<b>3</b>

### நோக்கம்

1. தமிழ் மரபுக்கவிதை, புதுக்கவிதை முதலானவற்றை அறிமுகப்படுத்துதல்.
2. சிறுகதை, நாவல், கட்டுரை முதலான இலக்கிய வடிவங்களைக்காத்தல்.
3. இக்கால இலக்கியத்தின் மீதான கப்பை விருவித்தல்.

### கூறு: 1 செய்யுள்

நேரம்:18

1. பாரதியார் : கண்ணன் என் காதலன் — கண்ணம்மா என் காதலி  
(முதல்பாடல் மட்டும்)
2. பாரதிதாசன் : தமிழின் இனிமை, தமிழ் உணர்வு
3. கவிமணி : ஒற்றுமையே , உயர்வு நிலை - நாட்டுக்குழைப்போம்
4. சுரதா : சிக்கனம்

### கூறு: 2 செய்யுள்

நேரம்:18

1. பட்டுக்கோட்டை கல்யாணசுந்தரம்:நாட்டுக்கொரு வீரன்
2. கண்ணதாசன் : காலக்கணிதம்
3. மு.மேத்தா: கண்ணீர் பூக்கள், ஊர்வலம், தாய், வெளிச்சம் வெளியே இல்லை
4. அப்துல் ரகுமான் : தேவகானம் - தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள்.

### கூறு: 3 சிறுகதை

நேரம்:18

1. கேட்டிவி : குரல்கொடுக்கும் வானம்பாடி (1-10 )
2. கேட்டிவி : மனோரஞ்சிதம் (1-10)

### கூறு: 4 புதினம்

நேரம்:18

புதினம் : துணிந்தவன் - வல்லிக்கண்ணன்

### கூறு: 5 நாடகம், இலக்கிய வரலாறு

நேரம்:18

- 1.நாடகம் : மாமன்னன் இராசராசன் - கு.வெ.பாலசுப்பிரமணியன்
- 2.இலக்கிய வரலாறு : இருபதாம் நூற்றாண்டு இலக்கியங்கள்

### பயன்கள்

1. தமிழ் இலக்கியத்தின் மீதான ஆர்வம் மிகும்.
2. புதிய இலக்கிய வளங்களை அறிவார்.
3. கவிதை, சிறுகதை ஆகியவற்றைப் படைக்க முயல்வார்.
4. போட்டித் தேர்வுகளுக்குச் செல்பவர்கள் பயன் பெறுவார்.
5. நாடகக் கலைத்திறனை அறிவார்



### BCA

Semester	Subject code	Title of the course	Hours of	No. of
Semester	Course Code	Title of The Course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20U1CAE1</b>	<b>PART – II - Prose, Poetry and Communication Skills</b>	<b>6</b>	<b>3</b>

#### Objective

- **To initiate the students to understand English through Prose, Poetry and Basic Communicative Grammar.**

#### Unit – I

- |                    |   |
|--------------------|---|
| Shakespeare        | - Shall I Compare Thee to a Summer's Day? |
| John Milton        | - On His Blindness                        |
| William Wordsworth | - The Solitary Reaper                     |
| P.B.Shelley        | - Song to the Men of England              |
| Robert Frost       | - The Road not Taken                      |
| Nissim Ezekiel     | - Night of the Scorpion                   |

#### Unit – II

- |                                 |                               |
|---------------------------------|-------------------------------|
| 1) The Running Rivulets of Man, | 2) Parliament is Marking Time |
| 3) The Lady in Silver Coat,     | 4) Mr. Applebaum at Play      |

#### Unit – III

- |                                       |                          |
|---------------------------------------|--------------------------|
| 1) The Feigning Brawl of an Impostor, | 2) Thy Life Is My Lesson |
| 3) Solve the Gamble,                  | 4) The Stoic Penalty     |

#### Unit – IV

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| 1) Nobility in Reasoning,       | 2) Malu the Frivolous Freak         |
| 3) Bharath! Gird Up Your Loins! | 4) Honesty is the Cream Of Chastity |

#### Unit – V

- |   |                             |             |              |
|---|-----------------------------|-------------|--------------|
| 1) The sentence   | 2) Parts of Speech          | 3) Nouns-I  | 4) Nouns –II |
| 5) Adjectives   | 6) Comparison of Adjectives | 7) Articles | 8) Pronouns  |
| 9) Demonstrative, Indefinite, Interrogative, Distributive and Reciprocal Pronouns |                             |             |              |
| 10) Relative Pronouns      11) Adverbs.   |                             |             |              |

#### Course outcomes:

**After the completion of this course, students will be able to**

- **understand and appreciate the English Prose, Poetry and basic functional communicative Grammar and study on style and substance.**
- **develop interest in appreciation of literature**
- **integrate the use of the four language skills: LSRW.**
- **communicate appropriately and use English effectively**
- **imbibe ethical, moral, national and cultural values**

#### Prescribed Texts:

- K.T.V. *A Melodious Harmony*. Thanjavur: Rajendra Publishing House, 2017.  
 Natarajan, K. *Flying Colours*. Chennai: New Century Book House (P) Ltd., 2017.  
*Advanced Grammar and Composition*. Chennai: New Century Publishing House, 2017.

## *BCA*

			Teaching/ Week	Credits
<b>I</b>	<b>20U1CAC1</b>	<b>Problem Solving using Python</b>	<b>7</b>	<b>6</b>

**Objectives:**

- To provide a programming experience to the students by learning the
  - To teach fundamentals of python programming.
  - To demonstrate the syntax of the language and apply the concepts to write programs for solving simple problems.
  - To illustrate the importance of the data structures and how the same is used for writing efficient programs.
  - To cultivate game development using their creativity.
- 

**UNIT I:**

Python – Features of Python: Installing python- The python Interpreter – Interactive mode –Writing and running programs in script mode- IDLE programming environment Data Types : Comments -Docstrings – Variables – Datatypes – Constants – Reserved Words – Naming conventions – Operators – precedence - Input, processing and output – Displaying output with print function –Reading input from the Keyboard –Comment Line Arguments - Control Statements – if – if else – if elif – while – for – nested loops – break – continue – pass – return statements.

---

**UNIT II:**

Strings and Characters – indexing – string manipulation – Functions : - Definition – calling a function – formal and actual arguments – positional arguments – keyword arguments – default arguments – variable length arguments – local and global variables – recursive functions – lambda function - Lists and Tuples: Sequences – Introduction to Lists – List slicing – 'in' operator – list methods and built-in-functions – copying lists – processing lists – Two Dimensional Lists – Tuples Basic operation on Tuples - Dictionaries – methods – converting list and string into dictionary – passing dictionary to function.

---

**UNIT III:**

Object Oriented Programming: Procedural and Object Oriented Programming – features of OOPS - Classes and objects – Types of Methods – Inheritance: introduction to inheritance – Types – Polymorphism – Operator overloading – Method Overloading – Method Overriding - Abstract classes and Interfaces

---

**Unit IV:**

Errors and Exception – Types of Exception – assert statement - File Handling: Types of files – open – close – pickle – seek() and tell() methods - Regular Expressions – using regular expressions on files.

---

## ***BCA***

### **UNIT V:**

GUI programming: Root Window – Fonts and Colors – Working with containers – canvas – Frame – widgets – button widget – Label widget – Message – Text – Scrollbar – Checkbutton – Radiobutton – Entry Widget- Listbox – Menu Widget.

---

### **Course Outcomes:**

After completion of the course, students will be able to

- read, write & execute by hand simple python programs.
- understand the numeric or real life application problems and solve them.
- apply the best features available in python to solve the situational problems.
- becoming a python developer in IT companies.
- do problem solving and programming capability for the career of software engineers, system analysts and program Managers.

### **Text Book:**

Core Python Programming , 2<sup>nd</sup> Edition (kindle) – Dr.R.Nageswara Rao – Dreamtech Press – 2018.

### **Reference Books:**

1. Tony Gaddis, "Starting out with python", 2nd edition, Addison Wesley, Pearson
2. Michael Dawson, "Python programming for the absolute beginner", Premier press, 2003.
3. "Core python Programming "by Wesley Chun Pearson Education- 2006 ,Second Edition ,ISBN:0137061595

**BCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>I</b>	<b>20U1CACP1</b>	<b>LAB – I PROGRAMMING IN PYTHON LAB</b>	<b>3</b>	<b>3</b>

**Objectives:**

- To teach with Operators and control Structures.
- To impart generate programs using sequences, functions and modules.
- To illustrate programs using OOPs concepts and Tkinter Module.
- To inculcate read, write & execute by hand simple python programs.
- To cultivate numeric or real life application problems and solve them.

---

**Solve Problems using the concepts**

- Operators
- Decision making statements
- Loops
- Data Structures
- Functions
- Modules
- Classes and Objects
- Inheritance
- Overloading
- Regular expressions
- Tkinter Module

---

**Course Outcomes:**

After completion of the course, students will be able to

- writing reusable, testable and efficient code.
- solve programs using sequences, functions and modules.
- design and execute programs using OOPs concepts and Tkinter Module.
- solve the various data analytics problems.
- becoming a python developer, Software Analyst in IT companies.

## *BCA*

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No.of Credits
<b>I</b>	<b>20U1CAMMA1</b>	<b>Allied - Numerical Analysis and Statistical Methods</b>	<b>5</b>	<b>3</b>

### **OBJECTIVES:**

- To introduce the concepts of correlation & regression.
- To teach various methods to find the roots of the equations.
- To impart the knowledge of predictor and corrector methods.

### **Unit I**

Algebraic & Transcendental equations: Bisection Method – Iteration method – Newton Raphson Method – Finite differences – Newton's forward & backward difference interpolation formulae.

### **Unit II**

Solutions to simultaneous linear algebraic equations: Gauss Elimination Method – Gauss Jacobi & Gauss Seidal iterative methods – Simple problems only – Numerical differentiation: Newton's forward & backward difference formulae for derivatives.

### **Unit III**

Numerical solution of ODE: Solution by Taylor Series Method – Euler's Method, Runge-Kutta method (4<sup>th</sup> order only) – Milne's Predictor Corrector Method – Adam's predictor Corrector Method.

### **Unit IV**

Arithmetic Mean – Median – Mode – Standard Deviation – Variance of the combined series .

### **Unit V**

Correlation and Regression – Properties of Simple correlation and regression coefficients - Simple Numerical Problems only

### **COURSE OUTCOMES:**

After completion of the course, student will be able to

- calculate measures of central tendency and measures of dispersion.
- use standard numerical and statistical methods to solve complex engineering problems.
- find the roots of algebraic and transcendental equations.
- To solve the ordinary differential equations by using various methods.
- correlate the relations between the variables.

### **Text Book:**

1. **Numerical Methods**, P. Kandasamy, K. Thilagavathy, K. Gunavathi, S. Chand, 2007.

Unit – I: Chapter 3(Sec.3.1, 3.2,3.4), Chapter 5(Sec.5.1), Chapter 6(Sec.6.2, 6.3),

Unit – II: Chapter 4(Sec. 4.2, 4.8, 4.9), Chapter 9(Sec. 9.2, 9.3)

Unit – III: Chapter 11(Sec. 11.5, 11.9, 11.13, 11.17, 11.18)

2. **Fundamentals of Mathematical Statistics**, S.C. Gupta & V.K. Kapoor, Sultan

Chand & sons, New Delhi, 2014.

Unit – IV: Chapter 2 (Sec. 2.5 – 2.7, 2.13.4),

Unit – V: Chapter – 10(Sec.10.2–10.4, 10.7),

Chapter – 11(Sec.11.1–11.2.2)

### **Reference:**

1. M.K.Jain., S.R.K.Iyengar and R.K. Jain. **Numerical Methods for Scientific and Engineering Computation**. New Age International Private Limited, 1999.
2. C.E. Froberg. **Introduction to Numerical Analysis**, II Edn., Addison Wesley. 1979.

## *BCA*

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
<b>I &amp; II</b>	<b>20U2CAMAA2</b>	<b>Allied- Discrete Mathematics (NS)</b>	<b>3+3</b>	<b>--</b>

### **OBJECTIVES:**

- To introduce the concepts of mathematical logic.
- To teach the operations associated with sets, functions and relations.
- To enrich the knowledge of graphs and trees.

### **Unit – I**

**Mathematical Logic :** statements and notation – connectives – negation conjunction – disjunction – Statement formulas and truth tables – conditional and bi-conditional – well formed formulae – Tautologies – equivalence of formulae – duality law – disjunctive normal form – conjunctive Normal form.

---

### **Unit – II**

**Set Theory:** Basic concepts – Notation – Inclusion and equality – Power set – some operations on sets – Venn diagrams – Some basic set identities – principle of specification – ordered pairs and n-tuples – Cartesian products.

---

### **Unit – III**

**Relations and ordering:** relations – properties of binary relations – relation matrix – partition and covering of a set – equivalence relations – compatibility relations composition of binary relations – partial ordering – partially ordered set – **Functions:** Definition and introduction – composition – inverse function – binary and n-array operation.

---

### **Unit – IV**

**Graph:** Graph – Sub-graphs – Walks, paths and Circuits – Connected graphs – Euler graphs – operations on graphs – Hamiltonian paths and circuits – Traveling salesman problem.

---

### **Unit – V**

**Trees:** trees – properties of trees – pendant vertices – distance and centers in a Tree- Rooted and Binary Trees – on counting trees – Spanning Trees – Fundamental circuits – Spanning Trees in a weighted graph – Shortest spanning tree: kruskal algorithm.

---

### **COURSE OUTCOME:**

After completion of the course, student will be able to

- apply mathematical logic to solve problems.
- understand sets, relations, functions and discrete structures.
- use logical notations to define and reason about fundamental mathematical concept such as set relations and functions.
- able to model and solve real world problems using graphs and trees.
- formulate truth table for expressions involving the logical connectives: negation, conjunction, disjunction, conditional and biconditional.

## **BCA**

### **Text Book:**

1. J.P.Tremblay, R.Manohar, "**Discrete Mathematical structures with Applications to Computer Science**" Tata McGraw Hill International, 2004.

Unit – I : Chapter 1 (Sec. 1.1 – 1.2.10, 1.3.1, 1.3.2)

Unit – II : Chapter 2 (Sec. 2.1)

Unit – III : Chapter 2 (Sec. 2.3, 2.4.1 – 2.4.4)

2. Narsing Deo "**Graph Theory with Applications to Engineering and Computer Science**". PHI. Private Ltd., 2014.

Unit – IV : Chapter 1, 2

Unit –V : Chapter 3

### **Reference:**

1. Bernard Kolman & Robert C.Busby "Discrete Mathematical Structure for Computer Science" (Revised) PHI.

## BCA

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
<b>II</b>	<b>20U2CAT2</b>	<b>இடைக்கால இலக்கியம் - பயன்முறைத் தமிழ் - இலக்கண வரலாறு</b>	<b>6</b>	<b>3</b>

**நோக்கம் :**

1. தமிழிலக்கிய வரலாற்றில் பக்தி இலக்கியங்கள் பெறும் சிறப்பை உணர்வர்.
2. சமய வழிச் சமூக மாற்றத்தின் பெறுவர்.
3. சமய நல்லிணக்க உணர்வை மாணவர்கள் பெறுவர்.

**கூறு: I**

**நேரம்: 18**

1. திருஞானசம்பந்தர் தேவாரம் : சீகாழி திருப்பதிகம் (பா.எ.360—370)
2. திருநாவுக்கரசர் தேவாரம் : திருவையாற்றுப் பதிகம் (பா.எ.124—133)
3. சுந்தரர் தேவாரம் : திருமழபாடி பதிகம் (பா.எ.1-10 பாடல்கள்)
4. மாணிக்கவாசகர் : திருவாசகம் - பிடித்த பத்து

**கூறு: 2**

**நேரம்: 18**

1. பெரியாழ்வார்: திருமொழி - தாய்ப்பால் உண்ண அழைத்தல் 10 பாடல்கள்
2. குலசேகர ஆழ்வார்: பெருமாள் திருமொழி- தாலாட்டு - 10 பாடல்கள்
3. ஆண்டாள் நாச்சியார்: நாச்சியார் திருமொழி- திருமணக்கனவை உரைத்தல்
4. திருப்பாணாழ்வார்: அமலனாதிபிரான் -10 பாடல்கள்

**கூறு: 3**

**நேரம்: 18**

1. குமரகுருபரர்: மீனாட்சியம்மைப் பிள்ளைத் தமிழ் வருகைப் பருவம் - 10 பாடல்கள்
2. திரிகூடராசப்பக்கவிராயர் : குற்றாலக் குறவஞ்சி - குறத்தி மலைவளம் கூறல்
3. வீரமாமுனிவர்: தேம்பாவணி - காட்சிப்படலம் முழுவதும்
4. உமறுப்புலவர் : சீறாப்புராணம்-விலாதத்துக் காண்டம்-
5. கதீஜா கனவு கண்ட படலம்.

**கூறு: 4 பயன்முறைத் தமிழ்**

**நேரம்: 18**

எழுத்தியல்: உயிரெழுத்து, மெய்யெழுத்து, உயிர்மெய்யெழுத்து, முதலெழுத்து, சார்பெழுத்து, மொழிக்கு முதலாக இருதியாக வரும் எழுத்துக்கள், போலி. சொல்லியல்: இலக்கண, இலக்கிய வகையிலான சொற்கள். பொதுவியல் : எழுத்துப் பிழைகளை நீக்குதல், எழுத்துப் பிழைகளும் திருத்தங்களும், வலிமிகுதல், வலிமிகாமை, வாக்கிய அமைப்புகள் நிறுத்தற் குறியீடுகள்.

**கூறு: 5 இலக்கண இலக்கிய வரலாறு**

**நேரம்: 18**

1. இலக்கண வரலாறு (தமிழ்த்துறை வெளியீடு)
2. தமிழ் இலக்கிய வரலாறு: இடைக்கால இலக்கியம்

**பயன்கள்**

1. பல்வகை சமய இலக்கியப் போக்குகளை அறிந்து கொள்வர்.
2. சமயவழித் தமிழரின் வாழ்வியலை அறிவர்.
3. பல்வகை சமயக் கோட்பாட்டினை அறிந்துகொள்வர்.
4. பிழையின்றி எழுதப் பழகுவர்.
5. சமயங்களின் இன்றியமையாமையை உணர்வர்



### BCA

Semester	Course Code	Title of The Course	Hours of Teaching/ Week	No. of Credits
II	20U2CAE2	<b>PART – II- Extensive Readers and Communicative Skills</b>	<b>6</b>	<b>3</b>

#### Objective

- **To impart language and communicative skills through short stories, one-act plays and communicative grammar.**

#### Unit – I

- Shakespeare – The Seven Stages of Man
- Longfellow – A Psalm of Life
- Nissim Ezekiel – Enterprise
- William Wordsworth – The world is too much with us

#### Unit – II

- Anton Chekhov – The Bear
- Cedric Mount – The Never-Never Nest
- Farrell Mitchell – The Case of the Stolen Diamonds
- M.V. Rama Sharma – The Mahatma

#### Unit - III

- Fyodor Dostoevsky – The Christmas Tree and the Wedding
- The Duchess – The Jewelry
- O. Henry – The Romance of a Busy Broker

#### Unit – IV

Verb, Verbs – Mood and Tense, Concord or Agreement of the verb with the subject.

#### Unit – V

The Auxiliaries, Model Auxiliaries, Preposition, Conjunctions, Interjection.

#### Course outcomes

**After the completion of this course students will be able to**

- **promote the linguistic and communicative objectives through the study of poems, short stories and the communicative grammar.**
- **gain language and communicative skills through short stories**
- **identify and differentiate different forms of literature.**
- **engage in reflective writing after learning the prescribed lessons.**
- **enhance the communicative skills through LSRW**

#### Prescribed Texts:

- *Voices of Vision*, Board of Editors, NCBH, Chennai, 2016.
- *Communicative Grammar*, The Department of English Course Material.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20U2CAC2</b>	<b>C PROGRAMMING AND DATA STRUCTURES</b>	<b>6</b>	<b>6</b>

### **Objectives:**

- To teach the basics and advanced concepts of C programming language.
- To impart the concepts of linear data structures and its applications.
- To explain the concepts of non-linear data structures.
- To interpret the usage of sorting techniques.
- To demonstrate the concepts of hashing.

### **UNIT I BASICS OF C PROGRAMMING**

Data Types – Variables – Operators and Expressions – Conditional Statements – Control Statements – Arrays.

### **UNIT II ADVANCED C PROGRAMMING**

Functions – Pointers – Structures and Union – Preprocessor Directives – File Handling.

### **UNIT III LINEAR DATASTRUCTURES**

Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List Implementation – Doubly-Linked Lists – Circular Linked Lists – Stack ADT: Implementation of Stacks – Queue ADT: Implementation of Queues – Applications.

### **UNIT IV HIERARCHICAL DATA STRUCTURES**

Trees: Preliminaries – Implementation of Trees – Tree Traversals with an Application – Binary Trees: Implementation – Expression Trees – Search Tree ADT – Binary Search Trees – Applications of Trees.

### **UNIT V HASHING AND SORTING**

Fundamentals of Hashing – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Quadratic Probing – Double Hashing – Rehashing – Extendible Hashing  
Sorting Algorithms: Insertion Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sort.

### **Course Outcomes:**

After completion of the course, students will be able to

- understand basic and advanced concepts of C programming language.
- understand the basic terminology of algorithm, flowchart and gain awareness used in computer programming.
- design programs involving the various concepts like decision structures, loops, functions of C language.
- understand the dynamics of memory by the use of pointers and pointers with functions.
- understand basic knowledge for all other programming languages which is lead to face interview with confident in IT companies.

### **REFERENCES:**

1. Brian W. Kernighan, Dennis Ritchie, "The C Programming Language", Second Edition, Pearson Education, 2015.
2. Brian W. Kernighan, Rob Pike, "The Practice of Programming", Pearson Education, 1999.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 1997.
4. Y. Langsam, M. J. Augenstein, A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2004.
5. V. Alfred, J. E. Hopcroft, J. D. Ullman, "Data Structures and Algorithms", Pearson education Asia, 1983.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>II</b>	<b>20U2CACP2</b>	<b>Lab –II C PROGRAMMING AND DATA STRUCTURES LAB</b>	<b>3</b>	<b>3</b>

### **Objectives:**

- To introduce the concepts of structured programming language.
- To interpret skills in design and implementation of data structures and their applications.
- To impart linear data structures and non-linear data structures.
- To demonstrate hashing techniques.
- To illustrate the different sorting and searching techniques.

- 
1. Implementation of simple programs in C using Data types, Variables, Conditional and Iterative Statements.
  2. Implementation of simple programs in C using arrays and functions.
  3. Implementation of simple programs in C using structures and unions.
  4. Implementation of simple programs in C using pointers.
  5. Implementation of singly linked list ADT, doubly linked list ADT.
  6. Implementation of circular linked list ADT and applications of lists.
  7. Implementation of stack ADT using arrays and linked lists and applications of stack.
  8. Implementation of queue ADT using arrays and linked lists.
  9. Implementation of binary search tree ADT.
  10. Implementation of hashing techniques such as separate chaining, open addressing.
  11. Implementation of sorting algorithms – insertion sort, shell sort, merge sort.
  12. Implementation of searching algorithms – linear search and binary search.

### **Course Outcomes:**

After completion of the course, students will be able to

- apply knowledge to solve computer science and information technology problems using the basics of C programming and the concepts of data structures.
- design the concept of structure and union programs
- choose and apply non-linear data structures for a given application.
- apply different types of hashing techniques based on the problem requirements.
- use sorting techniques for a given real world application.
- understand all other programming languages which leads to become a software developer.

### BCA

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
I & II	20U2CMAAA2	Allied- Discrete Mathematics (NS)	3+3	4

**OBJECTIVES:**

- To introduce the concepts of mathematical logic.
- To teach the operations associated with sets, functions and relations.
- To enrich the knowledge of graphs and trees.

**Unit – I**

**Mathematical Logic :** statements and notation – connectives – negation conjunction – disjunction – Statement formulas and truth tables – conditional and bi-conditional – well formed formulae – Tautologies – equivalence of formulae – duality law – disjunctive normal form – conjunctive Normal form.

---

**Unit – II**

**Set Theory:** Basic concepts – Notation – Inclusion and equality – Power set – some operations on sets – Venn diagrams – Some basic set identities – principle of specification – ordered pairs and n-tuples – Cartesian products.

---

**Unit – III**

**Relations and ordering:** relations – properties of binary relations – relation matrix – partition and covering of a set – equivalence relations – compatibility relations composition of binary relations – partial ordering – partially ordered set – **Functions:** Definition and introduction – composition – inverse function – binary and n-array operation.

---

**Unit – IV**

**Graph:** Graph – Sub-graphs – Walks, paths and Circuits – Connected graphs – Euler graphs–operations on graphs – Hamiltonian paths and circuits – Traveling salesman problem.

---

**Unit – V**

**Trees:** trees – properties of trees – pendant vertices – distance and centers in a Tree- Rooted and Binary Trees – on counting trees – Spanning Trees –Fundamental circuits – Spanning Trees in a weighted graph – Shortest spanning tree: kruskal algorithm.

---

**COURSE OUTCOME:**

After completion of the course, student will be able to

- apply mathematical logic to solve problems.
- understand sets, relations, functions and discrete structures.
- use logical notations to define and reason about fundamental mathematical concept such as set relations and functions.
- able to model and solve real world problems using graphs and trees.
- formulate truth table for expressions involving the logical connectives: negation, conjunction, disjunction, conditional and biconditional.

## **BCA**

### **Text Book:**

1. J.P.Tremblay, R.Manohar, **"Discrete Mathematical structures with Applications to Computer Science"** Tata McGraw Hill International, 2004.  
Unit – I : Chapter 1 (Sec. 1.1 – 1.2.10, 1.3.1, 1.3.2)  
Unit – II : Chapter 2 (Sec. 2.1)  
Unit – III : Chapter 2 (Sec. 2.3, 2.4.1 – 2.4.4)
2. Narsing Deo **"Graph Theory with Applications to Engineering and Computer Science"**. PHI. Private Ltd., 2014.  
Unit – IV : Chapter 1, 2  
Unit –V : Chapter 3

### **Reference:**

1. Bernard Kolman & Robert C.Busby "Discrete Mathematical Structure for Computer Science" (Revised) PHI.
2. F. Hamary "Graph Theory" Addison Wesley Publishing Company

## BCA

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	20U2CAMAA3	Allied- Operation Research	5	3

### OBJECTIVES:

- To teach the concept of LPP formulation and finding its solution using graphical method.
- To introduce the concept of simplex, Big-M methods.
- To input the knowledge of sequencing, network problems.

### Unit I

**15 Hrs**

**Operation Research:** Linear programming formulations & graphical solution of two Variables – Canonical & standard forms of LPP.

### Unit II

**15 Hrs**

**Simplex Method :** Simplex Method for  $<$ ,  $=$ ,  $>$  constraints – Big M method of penalties.

### Unit III

**15 Hrs**

**Transportation problem:** Transportation algorithm – Degeneracy algorithm – Degeneracy in Transportation Problem, Unbalanced transportation problem – **Assignment Problem:** assignment algorithm – unbalanced Assignment problem.

### Unit IV

**15 Hrs**

**Sequencing problem:** Processing of n jobs through two machines – processing of n jobs through 3 machines – processing of two jobs through m machines.

### Unit V

**15 Hrs**

**Networks :** Network – Fulkerson's rule – measure of activity – PERT computation – CPM computation.

### COURSE OUTCOMES:

On completion of the course, student will be able to

- apply the basics of operation research to business situations.
- gain the knowledge of various optimization techniques like graphical method, simplex method, Big-M method.
- solve transportation and assignment problems.
- find the optimal solution for sequencing problems.
- use network in real life problems.

### Text Book:

P.K. Gupta and Manmohan, **Problems in Operations Research**, Sultan Chand publishers, New Delhi, 2014.

Unit – I	:	Chapters 1, 2, 3
Unit – II	:	Chapters 4, 5
Unit – III	:	Chapters 15, 16
Unit – IV	:	Chapters 17
Unit – V	:	Chapters 27

### Reference:

- [1] Prem kumar Gupta and D.S.Hira. **Operations Research: An introduction:** S.Chand and Co., Ltd., New Delhi.
- [2] Hamdy A.Taha, **Operations Research** (7<sup>th</sup> Edn.), McMillan Publishing Company, New Delhi. 1982.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20U2CAS1</b>	<b>Skill Based Elective – I New Media – 1</b>	<b>1</b>	<b>1</b>

### **Objectives:**

- To introduce system services and troubleshooting.
- To inculcate the OS installation process.
- To illustrate motherboard architecture.
- To teach the system organization.
- To interpret basic open office exercises.

### **Hardware Installation:**

System services and Troubleshooting- OS Installation – Driver Installation – Printer Installation – Software Installation – **Peripherals** – SMPS – RAM – Processor – Mother Board – Fan – Assembling Configurations

### **Open Office Exercises:**

1. Search, generate, manipulate data using Open Office
2. Business Letter and official letter creation
3. Working with Pictures and formatting pictures
4. Working with tables and formatting tables
5. Mail merge
6. Excel files - Worksheets, Inserting, Deleting and Renaming Worksheets. Center the worksheet horizontally and vertically on the page.
7. Headings - Rows, Columns, Row/Column, Inserting and Deleting Rows and Columns. Changing Column Width and Row Height. Merging Cells, Cell range.
8. Format Cells - Fonts, Alignment, Warp Text, Text Orientation, Border and Shading.
9. Data and picture representation
10. Visualization graphs - 2D, 3D chart creation in presentation.

### **Course Outcomes:**

After completion of the course, students will be able to

- understand the overall system configurations.
- understand idea about Installation process of all types of software in system.
- handle various troubleshooting to overcome some system issues.
- know to maintaining computer laboratory properly.
- have working knowledge in hardware field and also become a system administrator.

**BCA**

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
<b>III</b>	<b>20U3CAT3</b>	<b>காப்பியங்கள், கட்டுரைகள், இலக்கிய வரலாறு</b>	<b>6</b>	<b>3</b>

**நோக்கம்**

1. காப்பியங்களின் உள்ளடக்கம், உத்திகளைக் கற்றுக்கொடுத்தல்.
2. காலந்தோறும் காப்பியங்களில் காணலாகும் பாடுபொருள்களின் மாற்றங்களை எடுத்துரைத்தல்.
3. காப்பியச்சுவையை மாணவர்கள் அறிந்து கொள்ளச் செய்தல்.

**கூறு: I காப்பியங்கள் I**

**நேரம்: 18**

1. சிலப்பதிகாரம்: மதுரைக்காண்டம்-வழக்குரைகாதை
2. மணிமேகலை; மலர்வனம் புக்ககாதை
3. சீவக சிந்தாமணி: சுரமஞ்சரியார் இலம்பகம்
4. கம்பராமாயணம்: கங்கைப் படலம்

**கூறு: 2 காப்பியங்கள் 2**

**நேரம்: 18**

1. பெரியபுராணம் : மெய்ப்பொருள் நாயனார் புராணம்-முழுவதும்
2. அரிச்சந்திரபுராணம்: மயான காண்டம்
3. தேம்பாவணி: திருமணப் படலம்-1-10 பாடல்கள்
4. சீறாப்புராணம் : நபி அவதாரப் படலம்-1-10 பாடல்கள்.

**கூறு: 3 கட்டுரைத் தொகுப்பு**

**நேரம்: 18**

1. கேட்டிவி - இராகபாவம் (1-10)
2. கேட்டிவி - பயணங்கள் தொடரும்

**கூறு: 4 கட்டுரைகள், கழதங்கள் மொழிபெயர்ப்புப் பயிற்சி**

**நேரம்: 18**

பயிற்சிக்கட்டுரைகளும் கடிதங்களும் -பாவை வெளியீடு  
கட்டுரைப் பயிற்சி - 10 மதிப்பெண்கள்  
மொழிபெயர்ப்புப் பயிற்சி - 5 மதிப்பெண்கள்

**கூறு: 5**

**நேரம்: 18**

**அ. இலக்கிய வரலாறு**

காப்பிய இலக்கியங்கள் - சிற்றிலக்கியங்கள்

**பயன்கள்**

1. காப்பியங்கள் வாயிலாக அக்காலச் சமுதாயச் சூழலை அறிவர்.
2. பல்வேறு காப்பியங்களையும் ஒப்பிட்டு அவற்றின் தனித்தன்மைகளை அறிந்துகொள்வர்.
3. மீட்டுருவாக்கச் சிந்தனைகளை அறிவர்.
4. கட்டுரை எழுதும் திறன் பெறுவர்.
5. கடிதங்கள் எழுதும் பயிற்சி பெறுவர்.



**BCA**

Semester	Course Code	Title of The Course	Hours of Teaching /Week	No. of Credits
<b>III</b>	<b>20U3CAE3</b>	<b>PART - II Shakespeare, Extensive Readers And Communicative Skills</b>	<b>6</b>	<b>3</b>

**Objective**

- **To introduce the language and creativity of the world renowned dramatists and novelists to enhance the communicative skills of the learners.**

**Unit – I**

Julius Caesar

The Merchant of Venice

**Unit – II**

Macbeth

Twelfth Night

**Unit – III**

Romeo and Juliet

Tempest

**Unit – IV**

Charles Dickens – David Copperfield.

**Unit – V**

Simple, Compound, Complex and Compound – Complex Sentences, Analysis of Simple Sentences, Clauses, analysis of Complex Sentences, Analysis of Compound Sentences and Compound – Complex Sentences, Synthesis of Sentences, Transformation of Sentences – I, Transformation of Sentences – II

**Course outcomes**

**After the completion of this course students will be able to**

- **promote their communicative skills through the study of Shakespeare and modern communicative methods.**
- **expand their perception interacting with the culture across the world**
- **imbibe moral and ethical prescriptions**
- **appreciate the creative genius and affluent expressions of Shakespeare**
- **develop the creative and analytical faculty**

**Prescribed Texts:**

Natarajan, K.ed. *Selected Scenes from Shakespeare*. Chennai: NCBH, 2017.  
Hardy, Thomas.*The Mayor of CasterBridge*.(abridged)Chennai: Macmillan Publishers,2012.  
*Communicative Grammar*.Department of English Edition. 2017.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>III</b>	<b>20U3CAC3</b>	<b>Java Programming</b>	<b>6</b>	<b>6</b>

**Objectives:**

- To teach Programming concepts in Java.
  - To impart write, debug and document well-structured java applications.
  - To interpret the packages and interfaces in java.
  - To illustrate the Exception handling fundamentals.
  - To interpret the abstract windowing toolkits and applet applications.
- 

**Unit I**

Object Oriented Fundamentals and Java Evolution: Object oriented programming – encapsulation–inheritance–polymorphism–java genesis–characteristics – java programming techniques – reserved words – identifiers – literals – operators– separators – variables – types – arrays–operator precedence.

---

**Unit II**

Flow Control And Classes: If – else – Break – switch – Return Statements – Looping – While – do while – For – Comma statements – Declaration – Object reference – Instance – variables – new operators – method declaration – method calling – this operators – Constructor – Method over loading – Inheritance – Super class – Dynamic method dispatch – Final – Static – Abstract classes.

---

**Unit III**

Packages and Interfaces: Packages – The package statement – Import statements – Interface statement – implement statement – Constructor – String creation – String concatenation – Character Extraction.

---

**Unit IV**

Exception Handling: Exception Handling Fundamentals – The java Thread model priorities – synchronization – Runnable – The synchronized statements – Dead lock – Thread API Summary.

---

**Unit V**

Abstract Windowing Tools & Applets: Events – listeners – Events handling methods – Inheritance hierarchy control classes – Labels – Layouts – Windows and frames – Menus – dialogs – Mouse events – Adaptor classes – Inner classes. Applets – HTML Applet Tag – Order of Applet Initialization.

---

## ***BCA***

### **Course Outcomes:**

After completion of the course, students will be able to

- understanding the principles and practice of object oriented analysis and design.
- write, debug and document well-structured Java applications.
- become a java developer in IT field.
- use applets for web based applications.
- work with Generics, networking and GUI based application development.

### **References:**

1. PATRICK NAUGHTON, "The JAVA Hant Book" , Tata MC\_Graw Hill Publishers Company Pvt. Ltd, 1996.
2. KENNY CHU – "The Complete Reference Java", Tata McGraw Hill Publishers company Pvt. Ltd, 1997.
3. Herbert schildt, "The Complete Reference Java 2" , Tata McGraw Hill Publishers company Pvt. Ltd, Fifth Edition. 2008.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>III</b>	<b>20U3CACP3</b>	<b>Lab – III Java Programming Lab</b>	<b>3</b>	<b>3</b>

### **Objectives:**

- To introduce the various features of the java.
- To interpret web based applications.
- To demonstrate the packages and interfaces in java.
- To illustrate the exception handling fundamentals.
- To inculcate the abstract windowing toolkits and applet applications.

1. Write a java program that will accept command line arguments and print the same in order (ascending & descending)
2. Write a java program that will print details about the current date, time, month, year, day of month & day of week
3. Write a java program
  - a. test equality between two strings
  - b. concatenate the two strings
  - c. find the length of the string
  - d. replace the 'i' in the string with 'z'
  - e. convert one of the string to upper & lowercase
4. Create an integer array to contain ten numbers. using random access file, write the array into a file called randl.dat. The program should read the contents of the rand.dat file backwards. Make use of try, catch & finally clauses
5. Create a subpackage called child whose base package is called parent. This should contain a class c1. class c1 contains a method called disp() to display a message "Inside sub package child- c1 class", create a class called parenttest, which imports this subpackage and calls the disp() method of the c1 class.
6. Write a java program to accept parameters on the command line. If there are no command line arguments entered, the program should print error message and exit. The program should check if the first file exists and if it is an ordinary file. If it is so contents of the first file should be copied to the second file, In case the first parameter is a directory, print message accordingly and exit. appropriate message should be displayed at all points.
7. Create applet to accept an integer as parameter and display name message as "Are You year old? "the age should be displayed in the blank space the default age should be 60.
8. Create applet to display string "I am in the center" in courier font, with size 30 and style bold and italic this text should be centered both horizontally and vertically.
9. Create an applet that lets the user adjust its background color, provided three scrollbars in your applet, one each for the three basecolors, red, green, blue.
10. Using html tag to create the college website (minimum 15 to 20 tag used)

### **Course Outcomes:**

After completion of the course, students will be able to

- learn to implement, compile, and test run Java programs.
- acquire skills and knowledge in various File Handling Techniques.
- implement Java classes from specifications and effectively create and use objects from predefined class libraries.
- become a web designer by create websites by using HTML tags.
- create many real time projects as a software developer.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching / Week	No.of Credits
<b>III</b>	<b>20U3CABAA1</b>	<b>Allied – Organizational Behaviour</b>	<b>6</b>	<b>3</b>

### **Objective**

- To teach the concepts of organizational behaviour.
- To introduce students to psychology theories and research at individual, group and organisational levels
- To impart organisational behaviour and management practices by examining psychological principles;
- To interpret a critical evaluation of organisational practices and their impact on work behaviours, attitudes and performance.

---

### **UNIT 1**

**Hrs 15**

**Nature of Organizational Behaviour:** Concept of Organization –concept of organization behaviour-challenges and opportunities for organizational behaviour – Applying OB knowledge to management practices.

**Foundations of organizational Behaviour:** Classical Approach – Neoclassical approach-modern approach-Organizational behaviour models.

---

### **UNIT II**

**Hrs 15**

**Nature of Human Behaviour:** Concept of behaviour – Process of behaviour – Individual differences-Models of Man. **Personality:** Concept of Personality -Personality measurement. **Perception:** Concept of Perception-Interpersonal perception –Developing Perceptual Skills.

---

### **UNIT III**

**Hrs 15**

**Learning:** Concept of Learning – Learning theories – Reinforcement-organizational behaviour modification-Learning organization-Knowledge management. **Interpersonal Behaviour:** Nature of Inter personal behaviour –Transactional Analysis. **Group Dynamics:** Concept of group dynamics-Formal groups-Informal group or organization – Group behaviour-Group decision making – Intergroup behaviour.

---

### **UNIT IV**

**Hrs 15**

**Power and Politics:** Concept of Power -Politics. **Leadership:** Concept of Leadership – Leadership theories-Leadership styles – Leadership styles in Indian organizations-Contemporary issues in Leadership.

---

### **UNIT V**

**Hrs 15**

**Communication:** Concept of Communication – Communication symbols-Communication network- Barriers in communication- Making communication effective-Communication pattern in Indian organization. **Conflict Management:** Concept of conflict-Individual level conflict –Group level conflict- Organizational level conflict-Managing conflict-Negotiation.

---

## ***BCA***

### **Course Outcomes:**

After completion of the course, students will be able to

- compare and contrast theories of organizational behavior.
- analyze management issues as related to organizational behavior.
- understand ethical issues as related to organizational behavior
- understand the main theories of organisational behaviour.
- analyse how these theories and empirical evidence can help to understand contemporary organisational issues
- apply theories to practical problems in organisations in a critical manner.

Text Book:

1. L.M.Prasad "Organizational Behaviour" Sultan Chand & Sons Educational Publishers, New Delhi, Fifth Edition 2011.

### **References:**

1. Fred Luthans "Organizational Behaviour" McGraw Hill Publishers.
  2. Huge J. Arnold, Daniel C.Feldman "Organizational Behaviour" McGraw Hill Publishers.
- Stephen P.Robbins , Nancy Langton "Organizational Behaviour " Pearson Education series.

## **BCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III &amp; IV</b>	<b>20U4CABAP2</b>	<b>Organizational Dynamics Training Lab (NS)</b>	<b>3+3</b>	<b>--</b>

### **Objectives:**

- To provide practical experience for the complete personality development.
- To demonstrate the group discussion.
- To interpret change management.
- To cultivate leadership attributes.
- To teach communication skills.

- 
1. Developing interpersonal behavior to know themselves – Goal setting, Time management.
  2. Understanding group discussions.
  3. Developing leadership attributes.
  4. Improving communication.
  5. Practicing controls.
  6. Adopting to change management.

### **Course Outcomes:**

After completion of the course, students will be able to

- augment the level of confidence in articulation of the students in their communication.
- ensure that the students learn the parameters of group dynamics a key component of conversation
- analyze the complexities associated with management of the group behavior in the organization.
- equip them and train to present the best of themselves as job seekers.
- prepare them write their own resume and enhance their interview skills required by employers.

## BCA

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
<b>IV</b>	<b>20U4CAT4</b>	<b>சங்க இலக்கியம் - அறு இலக்கியம் - செம்மொழி தமிழ்-இலக்கிய வரலாறு</b>	<b>6</b>	<b>3</b>

**நோக்கம்:**

1. பழந்தமிழ் இலக்கியங்களின் திணைத்துறைக் கோட்பாடுகளை அறிதல்.
2. திணைசார் சமுதாய வாழ்வின் பல்வேறுபட்டப் பரிமாணங்களைப்
3. புலவர்கள் வாயிலாகவும் திணை இலக்கியத்தின் வாயிலாகவும் அறிதல்.
4. பழந்தமிழ் இலக்கியங்களின் உயர்தனித்தன்மை வாய்ந்த சிறப்பியல்புகளை அறிதல்.

**கூறு: I**

**நேரம்: 18**

**குறுந்தொகை**

1. குறிஞ்சி : தலைவன் கூற்று-யாயும் ஞாயும் யாராகியரோ - பா.எ.-40
2. முல்லை : தலைவி கூற்று-கருங்கால் வேம்பின் ஒண்பூ யாணர் - பா.எ.-24
3. மருதம் : தோழி கூற்று-யாய் ஆகியளே விழவு முதலாட்டி - பா.எ.-10
4. நெய்தல் : தலைவி கூற்று : நள்ளன் றன்றே யாமம் - பா.எ.-6
5. பாலை: செவிலி கூற்று-பறைபடப் பணிலம் - பா.எ.-15

**நற்றிணை**

1. குறிஞ்சி-நின்ற சொல்லர் பா.எ. 1
2. முல்லை:இறையும் அருந்தொழில் -பா.எ.161
3. மருதம்:அறியாமையின் அன்னை - பா.எ.50
4. நெய்தல்:இவளே கானல் நண்ணிய - பா.எ.45
5. பாலை:புணரில் புணராது பொருளே-பா.எ.16

**கலித்தொகை**

1. பாலை: எறித்தரு கதிர் தாங்கி- பா.எ.9
2. குறிஞ்சி : காமர் கடும்புனல்- பா.எ.39

**அகநானூறு**

1. குறிஞ்சி:நீர்நிறம் கரப்ப-பா.எ.18
2. முல்லை: வந்துவினை- பா.எ.44

**கூறு: 2**

**நேரம்: 18**

1. ஐங்குறுநூறு : குறிஞ்சி -அன்னாய் வாழிப்பத்து -பா.எ.201-210

2. புறநானூறு : பாடல் எண்கள் - 9,16,20,51,109

3. பதிற்றுப்பத்து:ஆறாம் பத்து-பா.எ.1 வடுவடு நுண்ணுயிர், பா.எ.2.கொடி நுடங்கு நிலைய

4. பரிபாடல் : ஏழாம்பாடல் - வையை

**கூறு: 3 பத்துப்பாட்டு**

**நேரம்: 18**

1. குறிஞ்சிப்பாட்டு - முழுவதும்

**கூறு: 4 அறநூல்கள்**

**நேரம்: 18**

1. திருக்குறள்: செய்ந்நன்றியறிதல், வினைத்திட்டம், நெஞ்சொடு கிளத்தல்
2. முதுரை: 1-10 பாடல்கள்.
3. நல்வழி: 11-20 பாடல்கள்
4. நீதிநெறி விளக்கம்: 51-60 பாடல்கள்

**கூறு: 5**

**நேரம்: 18**

**அ. செம்மொழித் தமிழ்— இலக்கிய வரலாறு: செம்மொழி வரலாறு:**

மொழி விளக்கம்-மொழிக்குடும்பங்கள்-உலகச் செம்மொழிகள் -இந்தியச் செம்மொழிகள் — செம்மொழித் தகுதிகள் - வரையறைகள் - தமிழின் தொன்மை - தமிழ்ச் செம்மொழி நூல்கள்.

**ஆ. இலக்கிய வரலாறு:**

சங்க இலக்கியங்கள், பதினெண் கீழ்க்கணக்கு நூல்கள்.



## BCA

### பயன்கள்

- 1.பழந்தமிழ் இலக்கியங்களை ஆய்வியல் நோக்கில் அணுகுவதற்கான வழிமுறைகளை உணர்த்துதல்.
- 2.பண்டைத்தமிழரின் அக, புற வாழ்வியலை மாணவர்கள் அறியச் செய்தல்
- 3.அறத்தின் பெருமையை உணர்வர்
- 4.ஒழுக்க நெறிகளைப் பின்பற்றுவர்
- 5.தமிழ் செம்மொழியின் பண்புகளை உணருதல்
- 6.சங்க இலக்கியத்தின் தொன்மை உணர்தல்

**BCA**

Semester	Course Code	Title of The Course	Hours of Teaching/ Week	No. of Credits
<b>IV</b>	<b>20U4CAE4</b>	<b>PART - II English For Competitive Examinations</b>	<b>6</b>	<b>3</b>

**Objective**

- **To prepare the learners for competitive examinations and the fundamentals of practical communication.**

**Unit – I**

Sequence of Tenses and Direct and Indirect Speech  
Punctuation and Capitals

**Unit – II**

Synonyms and Antonyms  
One – Word Substitutes for Phrases and Clauses.

**Unit – III**

Paragraph – Writing, Letter Writing.

**Unit – IV**

Precise – Writing, Expansion of Passages

**Unit – V**

Essay – Writing, Writing stories from outlines.

**Course outcomes**

**After the completion of this course students will be able to**

- **develop English language skills by equipping themselves to face competitive exams**
- **improve English language abilities and gain the skills of writing and vocabulary building**
- **gain confidence to face competitive exams**
- **assimilate grammatical rule clearly and precisely**
- **hone their presentation and public speaking skills**

**Prescribed Text:**

*English for Competitive Examinations*, NCBH, Chennai, Dec. 2019.

## **BCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>IV</b>	<b>20U4CAC4</b>	<b>Database Management Systems</b>	<b>6</b>	<b>6</b>

### **Objectives:**

- To explain the fundamental concepts of a relational database system.
- To illustrate a wide range of features available in a DBMS package.
- To interpret database requirements and determine the entities involved in the system and their relationship to one another.
- To introduce the logical design of the database using data modeling concepts such as entity-relationship diagrams.
- To inculcate a database using structured query language.

---

### **Unit I**

Introduction: Purpose of data base systems- View of data-Data models-Database Users and Administrators-Database Languages-Database Architecture-E-R Model:Basic concepts-Design issues-Constraints- Keys-ER-Diagrams-weak Entity set-Extended E-R features-Reduction to E-R schema

---

### **Unit II**

Relational model: structure – Relational Algebra: Fundamental, Additional & Extended operations Modification – View - Other Relational Database - Tuple Relational Calculus - Domain Relational Calculus.

---

### **Unit III**

SQL-Basic Structure-Set operation-aggregate Functions- null values- nested sub queries-Derived Relations-view-modification of database-join relations-Advanced SQL-Embedded SQL-Advanced SQL Features.

---

### **Unit IV**

Advanced SQL: Domain Constraints-Referential integrity-assertion-Application Design and Development-triggers-RDB design-Decomposition using Functional Dependency-Normalization Units-F.D

---

### **Unit V**

Indexing & Hashing-Basic concepts -Ordered indices-B++ tree index files-B tree index files-Static Hashing-Multiple Key Access-Comparison of ordered indexing and hashing-index definition in SQL.

---

## ***BCA***

### **Text Books:**

1. "Database System concepts", Abraham Silber Schatz, Henk F.Korth, S.Sudarsan, Fifth Edition, 2006, McGraw Hill.

### **Course Outcomes:**

After completion of the course, students will be able to

- emphasize the need, role, importance and uses of databases in application development.
- formulate solutions to a broad range of query problems using relational algebra/SQL.
- understand normalization theory and apply such knowledge to the normalization of a database.
- design E-R modeling for a given situation and provide the foundation for development of relational database structure.
  
- become a database administrator, data analysts in IT companies.

### **General References:**

1. Fred Mc Fadden, Jeffery A Hoffer, Mary B.prescott, "Modern Database Management", 5 Edition, Addison Wesley, 2000.
2. Elmasri, Navathe, "Fundamentals of Database System", Third Edition, Addison wesley, 2000.
3. Jeffrey D.Ulman, Jenifer widomj, "A First Course in Database System", pearson Education Asia, 2001
4. Bipin c Desai, "An Introduction to Database System", Galgotia publications Pvt Limited, 2001.
5. Database System Concepts, C.J. Date. Seventh Edition, 1993.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>IV</b>	<b>20U4CACP4</b>	<b>Lab –IV Database Management System And Accounting Package</b>	<b>3</b>	<b>3</b>

### **Objectives:**

- To explain the concepts of RDBMS and solving accounting problems using accounting package.
- To interpret a wide range of features available in a DBMS package.
- To teach various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
- To illustrate the importance of basic principles of accountancy.
- To cultivate accounts for various entities under different situations.

- 
1. Library information processing.
  2. Students mark sheet processing.
  3. Telephone directory maintenance.
  4. Gas booking and delivering system.
  5. Electricity bill processing.
  6. Bank transaction (SB)
  7. Pay roll processing.
  8. Inventory.
  9. Question database and conducting quiz.
  10. Purchase order processing.

### **Accounting Package:**

1. Journalising, Ledger posting.
2. Preparation of Trial Balance.
3. Preparation of Balance Sheet.
4. Preparation of cash Book.

### **Course Outcomes:**

After completion of the course, students will be able to

- write simple and complex SQL queries using DML and DCL commands.
- understand knowledge on the importance of basic principles of accountancy.
- use advanced features such as stored procedures and triggers and incorporate in GUI based application development.
- prepare accounts for various entities under different situations.
- become an accounts executive, accounting software manager. Create XML database and validate with meta-data (XML schema).
- Create and manipulate data using NOSQL database.

## **BCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III &amp; IV</b>	<b>20U4CABAP2</b>	<b>Organizational Dynamics Training Lab (NS)</b>	<b>3+3</b>	<b>3</b>

### **Objective**

- ❖ To provide practical experience for the complete personality development.
- ❖ To inculcate communication skills.
- ❖ To interpret practicing controls.

- 
1. Developing interpersonal behavior to know themselves – Goal setting, Time management.
  2. Understanding group discussions.
  3. Developing leadership attributes.
  4. Improving communication.
  5. Practicing controls.
  6. Adopting to change management.

### **Course Outcomes:**

After completion of the course, students will be able to

- learn the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
- understand the applicability of analyzing the complexities associated with management of individual behavior in the organization.
- identify complexities associated with management of the group behavior in the organization.
- understand organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.

## **BCA**

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
<b>IV</b>	<b>20U4CABAA3</b>	<b>Financial Accounting</b>	<b>5</b>	<b>4</b>

### **Objectives**

- To teach the basic concepts of accounting.
- To interpret accounting and conventions.
- To inculcate journal, ledger and trial balance preparations.
- To demonstrate profit and loss, trading and balance sheet.

### **Unit – I**

Accounting – Meaning – Methods of Accounting – Advantages and Limitations of Accounting – Accounting concepts and conventions – Principles of Accounting – Journal – Ledger – Trial Balance.

### **Unit – II**

Subsidiary Books – Purchase Book – Sales Book – Purchase Returns Book – Sales Returns Book – Bills Receivable and Payable Books – Cash Books. Average Due Date – Determination of Due Date

### **Unit – III**

Final Accounts of Sole Trader – Preparation of Trading account, Profit & Loss account and Balance Sheet.

### **Unit – IV**

Depreciation Accounting – Methods – Straight Line Method – Diminishing Balance Method – Annuity Method.

### **Unit – V**

Single Entry System – Features – Defects – Single Entry Vs. Double Entry System – Statement of Affairs Method – Conversion Method.

### **Course Outcomes:**

After completion of the course, students will be able to

- understand the financial accounting concepts.
- learn about subsidiary, purchase and sales books.
- prepare balance sheet, journal, ledger etc.,
- understand the bill payment, bill receive and cash book.
- get career opportunities in financial and account sections in all domains.

### **Reference Books:**

1. Reddy, T. S. and Murthy, A. Financial Accounting, Margham Publications, Chennai.
2. Gupta R.L. and Radhasamy, M. Advanced Accountancy, Sulthan Chand & Sons, New Delhi.
- Jain, S. P and Narang, K, Advanced Accountancy, Kalyani Publishers, New Delhi.

### **BCA**

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
<b>IV</b>	<b>20U4CAS2</b>	<b>Skill Based Elective – II NEW MEDIA-II</b>	<b>1</b>	<b>1</b>

#### **Objectives:**

- To teach the implementation of various drawing tools and techniques
- To illustrate about design principles of multimedia system
- To interpret multimedia applications in various domains
- To explain characteristics of rendering 3D objects for optimal system processing and analysis.
- To cultivate working with digital images and to manipulate them

#### **Multimedia Tools Exercises:**

1. Letterhead design
2. Newspaper Advertisement design
3. Invitation/Thank you card design
4. Brochure design
5. Newsletter design
6. Business Card and CD Cover design
7. 2D animation – Tweening (Motion & Shape)
8. Animation Button creation and events for the buttons
9. Video file editing , sub title addition
10. Audio dubbing and changing in a video

#### **Course Outcomes:**

After completion of the course, students will be able to

- design the invitation, brochure and newsletters.
- design the newspaper advertisement and business cards.
- understand audio dubbing and changing in videos.
- know basic things to create animation software.
- create the game oriented software applications.



## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>V</b>	<b>20U5CAC5</b>	<b>Operating Systems</b>	<b>6</b>	<b>6</b>

**Objectives:**

- To teach the design principles of operating system with different cases.
- To introduce the structure and organization of the file system.
- To explain what a process is and how processes are synchronized and scheduled.
- To interpret different approaches to memory management.
- To demonstrate the data structures and algorithms used to implement an OS.

**Unit I**

**Introduction and Process Concepts :** Definition of OS – Early History – History of DOS and UNIX operating system – definition of process – process states – process state transition – Interrupt processing – Interrupt classes – context switching – semaphores – Deadlock and Indefinite postponement.

---

**Unit II**

**Storage Management : Real Storage:** Real storage management strategies – Contiguous Vs non – contiguous storage allocation – Single user contiguous storage allocation – Fixed partition multiprogramming – Variable partition multiprogramming – Multiprogramming with storage swapping. **Virtual Storage :** Virtual storage management strategies – page replacement strategies – Working sets – Demand paging – Page size.

---

**Unit III**

**Processor Management:** Job and Processor Scheduling : Preemptive Vs No preemptive scheduling – Priorities – Deadline scheduling – FIFO – RR – Quantum size – SJF – SRT – HRN. **Distributed Computing:** Classification of sequential and parallel processing – Array processors – Dataflow computers – Multiprocessing – Fault tolerance.

---

**Unit IV**

**Device and Information Management:** Disk Performance Optimization: Operation of moving head disk storage – Need for disk scheduling – Seek optimization – FCFS – SSTF – SCAN – RAM Disks – optical disks. **File and Database Systems:** File system – Function – Organization – Allocating and freeing space – File descriptor – Access control matrix.

---

**Unit V****(Self Study)**

**Case Studies: Windows:** Memory Management – Overlaying – Extended and Expanded memory – Memory allocation – File system and allocation method – Internal and External common Memory management commands – File management commands. **UNIX:** Processes in UNIX – Memory management – I/O systems – File systems and allocation method – semaphores – command systems.

---

## ***BCA***

### **Course Outcomes:**

After completion of the course, students will be able to

- gain knowledge of the fundamental aspects of process and processor managements with deadlocks and CPU scheduling.
- understand the basic concepts of operating system process control, synchronization, and scheduling.
- understand the concepts and techniques involved in operating system memory management, secondary storage and file systems.
- explain the basic structure and functions of operating systems.
- identify the problems related to process management and synchronization and apply learned methods to solve basic problems.
- develop system software and tools which is support to get job in IT field.

### **Reference:**

1. H.M. Deital, "An introduction to operating system", Addison Wesley Second edition, 1998.  
Andrew S.Tanenbaum "Modern Operating System", Prentice – Hall of India, Second Edition, 1996.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>V</b>	<b>20U5CAC6</b>	<b>SOFTWARE ENGINEERING</b>	<b>5</b>	<b>6</b>

### **Objectives:**

- To introduce basic software engineering methods and practices, and their appropriate application.
- To interpret various phases in developing a Software.
- To describe software engineering layered technology and Process frame work.
- To illustrate of the role of project management including planning, scheduling, risk management, etc.
- To inculcate approaches to verification and validation including static analysis, and reviews.

---

### **Unit I**

**Introduction to Software Engineering:** introduction-some definitions-some size factor-Total effort devoted to software-distribution of effort-project size categories-how programmer spend their time-quality and productivity factors-managerial issues **Planning a software project: Introduction** –defining the problem-goals and requirements-developing solution strategy-planning the development process-the phased life Cycle Model-Milestones,documents,and Reviews-the cost model –The prototype life Cycle Model.

---

### **Unit II**

**Software Cost Estimation:** Introduction software cost factor-programmer Ability – product complexity-product size-Available Time –Required level of Reliability-Level of technology-**Software cost estimation Techniques**-Expert Judgment-Delphi cost estimation-work breakdown structures-algorithmic cost models-staffing Level Estimation-Estimating software Maintenance costs.-**software Requirements Definition**-The Software Requirement specification-Formal specification Techniques-Relational Notations-implicit Equations /Recurrence Relations.

---

### **Unit III**

**Software Design:** Introduction-Fundamental design concepts-Abstraction-Information hiding-structure-modularity-concurrency-verification-Aesthetics-Modules and Modularization Criteria- design Notation-data flow diagrams-structure charts-HIPO Diagrams-procedure templates-pseudo code-structured flow charts-structured English-Design Tables-Design Techniques-Stepwise Refinement- Level of Abstractions-structured design-integrated top-down development-Jackson structured programming-summary of design techniques.

---

**Unit IV**

**Implementation Issues**-introduction- structured coding techniques-single entry, single Exit Constructs-Efficiency considerations –Violations of single entry, single –data encapsulations-the go to statement-Recursions-coding style-standard and guidelines-documentation guidelines-supporting documents-internal documentations.

---

**Unit V**

**Verification and Validation Techniques**-introduction-quality assurance-walkthroughs and inspections- walkthroughs- inspections-static analysis-Symbolic Execution-unit Testing and Debugging-unit testing- Debugging-system testing-integration testing-acceptance testing-Formal Verification-input –output Assertions-weakest preconditions structural induction.

---

**Course Outcomes:**

After completion of the course, students will be able to

- understand of the role and impact of software engineering in contemporary business, global, economic, environmental and societal context.
- understand the requirements for real, time problems. analyze and use open source tools for project designing.
- develop user interface design for the given system.
- analyze and resolve information technology problems through the application of systematic approaches and diagnostic tools.
- estimate the cost of software and apply software management principles.
- emphasize software project management and project planning techniques and become a software tester in it industries.

**Reference:**

1. Richard E.Fairley, "Software Engineering Concepts", McGraw-Hill Book Company-1985.
2. Roger Pressman, "Software Engineering", Sixth Edition, McGraw-Hill Book Company, 2005.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>V</b>	<b>20U5CAC7</b>	<b>COMPUTER NETWORKS</b>	<b>5</b>	<b>5</b>

**Objectives:**

- To describe how computer networks are organized with the concept of layered approach.
  - To teach the working principle of various communication protocols.
  - To interpret the various routing algorithms.
  - To illustrate how packets in the Internet are delivered.
  - To demonstrate the concept of data transfer between nodes.
- 

**Unit I**

**Introduction To Networks And Communication Media:** Uses - Network Hardware - Net work software - Reference Models - Example Network - Network standardization. Basis for data communication- Transmission media - Wireless Transmission - Telephone system - Satellite Communication.

---

**Unit II**

**The Data Link Layer:** Data Link Layer design issues - Error Detection and Correction Methods - Elementary Data Link protocols - sliding Window protocols - Verification Methods Channel Allocation- Multiple Access protocols- IEEE 802 Standards.

---

**Unit III**

**The Network Layer:** Network Layer design issues - Routing algorithms- Congestion Control algorithms - Internetworking - Network Layer in Internet.

---

**Unit IV**

**The Transport protocols:** Transport Service - Transport protocols - Internet Transport protocols UDP-TCP-performance issues – User Datagram Protocol – Port Number – User Datagram Structure Application - **The Application Layer:** Application Layer design issues- Domain Names System

---

**Unit V (Self Study)**

Electronic Mail - word wide web - Multimedia - other Application- Network Security- Basic Cryptography-DES-RSA.

---

## ***BCA***

### **Course Outcomes:**

After completion of the course, students will be able to

- understand the basic concepts of computer networks and know the fundamentals of data communication
- identify the functionalities of OSI reference model and compare with TCP/ IP model
- comprehend the protocols and standards of ethernet, SNA model and digital network architecture
- understand the design of client / server computing and explain the architecture and protocols of different networks.
- practice packet /file transmission between nodes.
- knowledge to work in network management department in IT field.

### **Reference:**

1. Andrews S.Tanenbaum, "Computer Network", prentice Hall of India private Limited,(4Edition),2003.

### **General Reference**

Leon Garcia and Widjaja, "Communication Networks - Fundamental Concepts and key architecture", Tata McGraw Hill, 2001.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>V</b>	<b>20U5CACP5</b>	<b>Lab V- OPERATING SYSTEM AND WEB DESIGN</b>	<b>3</b>	<b>3</b>

### **Objectives:**

1. To illustrate the architecture of Unix OS.
  2. To provide necessary skills for developing and debugging programs in UNIX environment.
  3. To impart dynamic websites with good aesthetic sense of design.
  4. To demonstrate knowledge in applying system software and tools available in modern operating systems.
  5. To interpret the programming skills using markup and scripting languages.
- 

### **Operating System:**

1. Write a shell program to create a menu for copy, edit, rename and delete a file.
2. Write a shell program to generate menu creation.
3. Write a shell program to prepare the E.B.Bill.
4. Write a LINUX program to for file handling.
5. Write a shell program for merging a file.
6. Write a LINUX program to find a given word in the specific file.
7. Write a shell program for file checking and formatting and difference between two files.
8. Write a shell program to perform sorting and unsorting the file name.
9. Write a shell program for sorting the file depends upon the primary key.
10. Write a LINUX program to find whether the given number is palindrome number or not.
11. Write a shell program for counting words, lines and characters in a file.
12. Write a LINUX program to convert the Upper case to lowercase and lowercase to Uppercase.
13. Write a shell program to generate a Fibonacci series.
14. Write a LINUX program to find out the sum of digits.
15. Write a shell program to generate the use of pipeline and tree command.
16. Write a shell program to demonstrate the use of grep command.
17. Write a LINUX program for finding whether the number is Armstrong or not.
18. Write a program to find the given number is prime or not.
19. Write a shell program for various type of list using menu creation.

### **Web Design:**

- Create a web page with all types of cascading style sheets.
- Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
- Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
- Using JavaScript perform Form Validation with Limit Login Attempts.
- Write a PHP script to display the values entered into a Web form that contains:
  - i. One text input field ii. One text area iii. One hidden field
  - iv. One password field v. One selection list vi. Two radio buttons Two checkboxes.
- Create a calculator script that allows the user to submit two numbers and Choose an operation to perform on them (addition, multiplication, Division, subtraction).

## ***BCA***

- Write a program in PHP for admin interface to add and delete users Using MySQL.
- Create an authentication script that checks a username and password. If the user input matches an entry in the database, present the user with a special message. Otherwise, re-present the login form to the user.
- Create a database with three fields: email (up to 70 characters), message (up to 250 characters), and date (an integer that contains a Unix timestamp). Build a script to allow users to populate the database.
- Create a script that displays the information from the database. Use regular expressions to extract email addresses from a file. Add Them to an array and output the result to the browser.
- Write a program in PHP to upload file using form control.

### **Course Outcomes:**

After completion of the course, students will be able to

- create the concepts and techniques involved in operating system memory management, secondary storage and file systems.
- identify the problems related to process management and synchronization and apply learned methods to solve basic problems.
- handle the events and set the cookies in java script.
- develop the programming skills using markup and scripting languages.
- design and implement dynamic websites with good aesthetic sense of design as a web designer.
- have a good grounding of web application terminologies, internet tools, E-commerce and other web services.



**BCA**

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>V</b>	<b>20U5CAEL1A</b>	<b>Major Elective – I Business Intelligence and Analytics</b>	<b>4</b>	<b>4</b>

**Objectives:**

- To explain the fundamentals of business intelligence.
- To impart the data analysis and knowledge delivery stages.
- To inculcate appropriate technique and have knowledge to work in business process management in organizations.
- To illustrate various modeling techniques.
- To cultivate link data mining with business intelligence.

---

**Unit I**

Introduction to Business Intelligence: Business Intelligence - Mobile Business Intelligence - Real-time Business Intelligence.

Analytics: A Comprehensive Study: Business Analytics – Analytics - Software Analytics - Embedded Analytics - Learning Analytics - Predictive Analytics - Prescriptive Analytics - Social Media Analytics - Behavioral Analytics

---

**Unit II**

Data Mining: An Overview: Data Mining - Anomaly Detection - Association Rule Learning - Cluster Analysis - Statistical Classification - Regression Analysis - Automatic Summarization - Examples of Data Mining.

---

**Unit III**

Understanding Data Warehousing: Data Warehouse - Data Mart - Master Data Management - Dimension (Data Warehouse) - Slowly Changing Dimension - Data Vault Modeling - Extract, Transform, and Load - Star Schema.

---

**Unit IV**

Market Research: An Integrated Study: Market Research - Market Segmentation - Market Trend - SWOT Analysis - Marketing Research.

Essential Aspects of Business Intelligence: Context Analysis - Business Performance Management - Information System - Organizational Intelligence - Data Visualization - Process Mining.

---

**Unit V**

Operational Intelligence: Technological Components: Operational Intelligence - Business Activity Monitoring - Complex Event Processing – Business Process Management – Metadata - Root Cause Analysis.

---

**Course Outcomes:**

After completion of the course, students will be able to

- link data mining with business intelligence.
- apply various modeling techniques.
- explain the data analysis and knowledge delivery stages.
- understand business intelligence methods to various situations.
- decide an appropriate technique and have knowledge to work in business process management in organizations.

**Reference:**1. "Business Intelligence and Analytics", Drew Bentley, Published by Library Press.

**BCA**

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>V</b>	<b>20U5CAEL1B</b>	<b>Major Elective – I MANAGEMENT INFORMATION SYSTEM</b>	<b>4</b>	<b>4</b>

**Objectives:**

- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To demonstrate systems analysis, design and decision making in a business setting.
- To interpret the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To provide the theoretical models used in database management systems to answer business questions

---

**Unit I**

**Introduction To Information System:** why Study Information System - Why Business Need Information technology- Fundamentals of Information System - Overview of Information Systems.

---

**Unit II**

**Solving Business problems with Information System:** System Approach to problem Solving - Developing Information System Solution - Technical Foundations of Data Base Management.

---

**Unit III**

**Information System For Strategic Advantage:** - Fundamentals of Strategic Advantage-Strategic Application and Issues In It; Managing IT:Enterprise and Management.

---

**Unit IV**

**Business Applications of Information Technology:** The Internet and Electronic Commerce - Fundamentals of Electronic Commerce - Information System for Business Operations: Business Information System - Transaction processing System.

---

**Unit V**

**Information System for Managerial Decision Support:** Decision Support Systems- Artificial Intelligence Technology in Business - Managing IT-planning for business Change with IT-Implementing Business change with IT.

---

## ***BCA***

### **Course Outcomes:**

After completion of the course, students will be able to

- evaluate the role of information systems in today's competitive business environment.
- identify and describe important features of organizations in order to build and use information systems successfully.
- define and describe the fundamentals of hardware, software, database management, data communications and systems related to the management activities of an organization.
- assess how information systems support the activities of managers and end-users in organizations.
- identify the principal management challenges posed by the ethical and social impact of information systems and management solutions.
- apply the knowledge of how various information systems like DBMS work together to accomplish the information objectives of an organization.
- have knowledge to working in data management department in organizations.

### **Reference:**

1. "Management Information System", James A.O' Brein, Fourth Edition, Galgotia publications, 1999.

### **General Reference:**

1. "Management Information System", Gordon B. Davis Margre the H.Olson, Mc Graw Hill, 3rd Reprint 2000.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>V</b>	<b>20U5CAEL2A</b>	<b>Major Elective – II XML and Web Services</b>	<b>4</b>	<b>3</b>

### **Objectives:**

- To teach the basic concepts of XML Programming.
  - To interpret the role of web services in commercial applications.
  - To illustrate the WSDL (Web Service Description Language) for implementing web services
  - To demonstrate well-formed XML documents.
  - To explain the SOAP and REST for implementing web services.
- 

### **Unit I**

**The XML Galaxy** -Introduction-No-Predefined Tags-Documents-Document Structure-Markup Language History. Application of XML: Document Application-Data Application-Companion Standard: XML Namespaces-Style sheet-DOM and SAX- XLink and X Pointer. XML Soft-ware: XML Browser-XML Editor-XML Parsers-XSL Processor.

---

### **Unit II**

**The XML Syntax**-A first Look at the XML Syntax-Advanced Topics-Four Common Errors-Xml Editors- Three Applications of XML

---

### **Unit III**

**XML Schemas**-The DTD Syntax-Well-Formed and Valid Documents-Relationship between the DTD and the Document-Entities and Notation-Notations-Designing DTD's-Designing DTD's from an object Model.

---

### **Unit IV**

**Namespaces**-The problem Namespaces Solves-URIS-Namespaces and DTD-Application of Namespaces-XSL Transformation-Basic XSLT-Supporting a different Medium-Advanced XSLT.

---

### **Unit V**

**XSL Formatting Object and Cascading Style sheet:** The Basics of CSS-Flow Objects and Boxes-CSS Property Values-The Parsers and DOM-The Parser and the Application-Document Object Model-DOM in Application-SAX.

---

## ***BCA***

### **Course Outcomes:**

After completion of the course, students will be able to

- write the schema for the given xml documents in both DTD and xml schema languages
- apply theory and techniques to unseen problems without references to notes, to work independently, and to work under a time constraint.
- format XML data to the desired format.
- parse xml documents by using DOM, SAX, and STAX.
- identify and select the appropriate framework components in creation of web service solution.
- efficiently use market leading environment tools to create and consume web services.
- get knowledge to work as a program developer in software fields.

### **Book for Study:**

1. Benoit Marchal, "***XML BY EXAMPLE***" , Prentice Hall of India Pvt Ltd, New Delhi. ISBN 978-8120316645.

### **Books for Reference:**

1. David Hunter, Jeff Rafter, Joe Fawcett, "***Beginning XML***" Fourth Edition, Wrox Publications, ISBN: 978-047011487

## *BCA*

Semester	Subject Code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>V</b>	<b>20U5CAEL2B</b>	<b>Major Elective – II WEB TECHNOLOGY</b>	<b>4</b>	<b>3</b>

### **Objectives:**

- To interpret the basic concepts of HTML.
- To explain the insight for JavaScript.
- To illustrate the programming concepts of PHP.
- To cultivate necessary knowledge of the tools useful for creating dynamic website.
- To introduce web data using XML and develop web pages using JSP.

---

### **Unit I**

**HTML:** Basic HTML, The Document body, Text, Hyperlinks, Adding more formatting, Lists, Tables, Using colors and images, Images, Multimedia objects, Frames, Forms-towards interactivity, Cascading Style Sheets: Introduction, Using styles: Simple examples, Defining your own styles, Properties and values in styles.

---

### **Unit II**

**Client Side Scripting : JavaScript:** JavaScript—The basics, Variables, String manipulation, Mathematical functions, Statements, Operators, Arrays, Functions- Data and objects in java script, Regular expressions, Exception Handling, Built in objects, Events. Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, writing to a different frame, Rollover buttons, Moving images, multiple pages in a single download, A text-only menu system, Floating logos.

---

### **Unit-III**

**Server Side Scripting: PHP:** PHP Introduction – syntax of PHP - Variables – Constants - PHP operators – Flow of controls – PHP looping – Arrays . PHP Functions – PHP and Object Oriented Programming – PHP access specifiers.

---

### **Unit-IV**

PHP cookie – Session – Server variables – header() – Code reuse functions. PHP files – Introduction – Testing files – Accessing files – Functions for Directories.

---

### **Unit-V**

MySQL Database: Need for Database – MySQL Database, Insert, Query, Fetch Array, Select, Order by, Joins, Update, Delete, Groupby functions, Data Formats- Case Studies.

---

### **Course Outcomes:**

After completion of the course, students will be able to

- design simple web pages using markup languages like HTML and XHTML.
- create dynamic web pages using DHTML and java script that is easy to navigate and use.
- program server side web pages that have to process request from client side web pages.
- understand various web services and how these web services interact.
- get job software field as a web designer.

## ***BCA***

### **Books for Study:**

1. N.P Gopalan,J.Akilandeswari, "Web Technology" A Developer's Perspective, Prentice Hall of India Private Limited, New Delhi, 2008.
2. K.Meena, R.Sivakumar and A.B.Karthick Anand Babu, "Web Programming Using PHP and MySQL", Himalaya Publishing House, First Edition 2012.ISBN: 978-9350515815.

### **Books for Reference:**

1. Robin Nixon,"Learning PHP, MySQL &JavaScript With jQuery, CSS & HTML5"
2. O'Reilly Media, Fourth edition,December 2014, ISBN:978-1-491-91866-1.
3. David R. Brooks, "An Introduction to HTML and JavaScript for Scientists and Engineers",Springer-Verlag London Limited 2007, ISBN-13: 978-1-84628-656-.

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>V</b>	<b>20U5CANME</b>	<b>Non Major Elective Social Media Marketing</b>	<b>2</b>	<b>1</b>

### **Objectives:**

- To introduce social media marketing and how applied to the business in order to improve and promote business.
- To explain how to develop effective social media marketing strategies for various types of industries and businesses.
- To interpret the various social media strategies.
- To demonstrate Dos and Don'ts of social media.
- To describe the history of social media marketing, its rapidly evolving role in public relations, advertising, and marketing, as well as the merging of social media marketing with all facets of business.

### **Unit – I:**

Introduction - Social Media Marketing - The Most Important Social Media Websites - Blogging - Social Media Engagement - Social Media and Target Audience - Sharing Content on Social Media - Social Bookmarking Websites - Approach to Social Media.

---

### **Unit – II:**

Dos and Don'ts of Social Media - Social Media Strategy - Tips on Using Social Media in Marketing - Using Social Media for Promotion - How to Promote Using Social Media - Social Media ROI - Using Social Media for Branding - Using Social Media for Establishing Relationship - Social Media and SEO - Tools for Managing Social Media - Social Analytics - Automation and Social Media - Social Media and Other Types of Marketing.

---

### **Course Outcomes:**

After completion of the course, students will be able to

- Acquire Knowledge to building a loyal community.
- Track progress in achieving social media goals with a variety of powerful measurement tools, services, and metrics.
- Get idea about how to approach social media.
- Realize Dos and Don'ts of social media.
- Work on product development and improve sales.
- Use social media platforms (e.g., blogs, micro blogs, social networks, bookmarking, social news, Q&A sites, photo & video sharing, and podcasting) to influence consumer and promote a company, brand, product, service or person.

### **Text Book:**

1. "Social Media Marketing: Social Media Marketing Fundamentals", eMarketing Institute, Demark, eBook, 2018, Weblink: <https://www.emarketinginstitute.org/free-ebooks/social-media-marketing-for-beginners>



## *BCA*

Semester	Course Code	Title of The Course	Hours of Teaching/ Week	No. of Credits
<b>V</b>	<b>20U5CALSD</b>	<b>LIFE SKILLS DEVELOPMENT</b>	<b>1</b>	<b>-</b>

### **Course objectives**

- To enhance one's ability to be fully self aware by helping oneself to overcome all fears and insecurities and to grow fully from inside out and outside in.
- To increase one's knowledge and awareness of emotional competency and emotional intelligence at place of study/work.
- To provide opportunity for releasing one's potential through practical experience.
- To develop interpersonal skills and adopt good leadership behaviour for empowerment of self and others.
- To set appropriate goals, manage stress and time efficiently.
- To manage competency- mix at all levels for achieving excellence with ethics.

### **Unit – I**

**(30 hrs)**

#### **Communication and Professional skills**

1. Writing and different modes of writing.
2. Digital Literacy.
3. Effective use of social media.
4. Non verbal communication.
5. Resume skills.
6. Presentation skills.
7. Listening as a Team skill.
8. Brainstorming.
9. Social and cultural Etiquettes.
10. Internal communication.

### **Unit – II**

**(30 hrs)**

#### **Leadership, management and Universal Human Value**

1. Leadership skills.
2. Managerial skills.
3. Entrepreneurial skills.
4. Innovative Leadership and Design thinking.
5. SWOT (Strengths, Weaknesses, Opportunities and Threats Analysis)
6. EQ (Emotional Quotient)
7. Love and Compassion.
8. Truth.
9. Non Violence.
10. Righteousness.
11. Ethic and Integrity.

### **Course outcomes**

At the end of the programme learners will be able to:

- Gain Self Competency and Confidence.
- Practice Emotional Competency.
- Gain Intellectual Competency.
- Gain an edge through Professional Competency.
- Aim for high sense of Social Competency.
- Be an integral Human Being.

### **References:**

1. Bailey, Stephen, Academic Writing: A handbook for International Students, 2010 Rourlege.
2. Shlpa Sablok Bhardwaj (2018). Computer Applications for Class 9 MS Office Blueprint Education (Contributor).
3. [http:// WWW.lyfemarketing.com](http://WWW.lyfemarketing.com) / blog / how-digital – marketing – works/
4. [http:// WWW.thoughtco.com/what-is-nnverbasl - communication - 1691351](http://WWW.thoughtco.com/what-is-nnverbasl - communication - 1691351)
5. [http:// WWW.wikihow.com/Write-a-Neat-Resume](http://WWW.wikihow.com/Write-a-Neat-Resume)
6. [http:// WWW.gildabonanno.com/presentation-skill-coaching-videos](http://WWW.gildabonanno.com/presentation-skill-coaching-videos)
7. [http:// blog.vantagecircle.com/active-listening/](http://blog.vantagecircle.com/active-listening/)
8. Osborn, A.F. (1963) Applied imagination: Principles and procedures of creative problem solving (Third Revised Edition). New York, NY: Charles Scribner's Sons.
9. [http:// WWW.thespruce.com/what-is-etiquette-and-why-is-it-important-1216650](http://WWW.thespruce.com/what-is-etiquette-and-why-is-it-important-1216650)
10. [http:// WWW.talkfreely.com/blog/internal-and-eternal-communication](http://WWW.talkfreely.com/blog/internal-and-eternal-communication).

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>VI</b>	<b>20U6CAC8</b>	<b>Distributed Programming using .net</b>	<b>5</b>	<b>6</b>

**Objective:**

- To introduce the .NET architecture and its applications.
- To interpret features of C#, ASP.NET and ADO.NET programming.
- To explain an applications in the .NET platform.
- To inculcate the difference between .NET and Java framework.
- To impart all the features of C# language and build complex web applications in .NET framework.

---

**Unit – I**

Introduction to .NET: .NET Framework, Components of .NET Framework, Visual Studio .NET IDE- Introduction to Visual Basic .NET- Console Applications, Data Types – Operators- Flow of Controls.

---

**Unit – II:**

Introduction to C# .NET - Features of C#, similarities and Differences between C# and VB- similarities and Differences between C# – Classes and Objects in C#- Operators, Types and Variables in C#- Selective and Iterative flow of Controls.

---

**Unit – III:**

**Advanced Features of C#:** Arrays – Indexers and Collections – Inheritance – Properties – Abstract Properties - Polymorphism – Attributes – Structs - Exceptions – Delegates and Events.

---

**Unit – IV:**

ADO.NET and its components – Database project in VB.NET , Structured Query Language – Navigate database with VB.NET – Database coding with Oracle and SQL server - **ASP.NET:** Introduction – Components – Web pages – Server Controls – Validation Controls – Data Binding – ArrayList object - Hashtable object

---

**Unit V: (Self Study)**

XML files – Repeater Controls – Master Pages – Themes – Database Connection – Case study with Web services.

---

## **BCA**

### **Course Outcomes:**

After completion of the course, students will be able to

- work with the basic and advanced features of C# language.
- create web application using ASP.NET.
- create mobile application using .NET compact framework.
- integrate all the features of C# language and build complex web applications in .NET framework.
- work as .Net program developer in software companies.

### **Books for Study:**

2. K.Meena, R.Sivakumar and A.B.Karthick Anand Babu, "Dot NET Technologies", Himalaya Publishing House, First Edition 2016.
3. Stephen C. Perry, Atul Khate, Joseph Mayo, " **Essentials of .Net and Related Technologies: With a focus on C#, XML, Asp.NET and ADO.NET**" ,First Edition, Pearson Education., 2009.
4. Matt Telles, Kogent Solutions Inc.Telles, "**C# 2005Programming, Black Book**", Dreamtech Press, 2007.
5. Schildt, Herbert, "**C#: The Complete Reference**" , Second Edition, McGraw-Hill, 2008.  
Kevin Hoffman & Jeff Gabriel, "**Professional .NET Framework**" Shorff Publish-ers and Distributors Pvt. Ltd

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>VI</b>	<b>20U6CAC9</b>	<b>Cloud Computing</b>	<b>5</b>	<b>5</b>

### **OBJECTIVES**

- ❖ To introduce the basic concepts of Cloud Computing.
- ❖ To demonstrate the cloud services and developing cloud in different platforms.
- ❖ To illustrate the various applications of cloud computing.
- ❖ To interpret the distributed computing, distributed resource management.
- ❖ To explain the core issues of cloud computing such as resource management and security

### **UNIT I**

**Cloud Computing Fundamentals:** Learning Objectives – Preamble Motivation for Cloud Computing – The Need for Cloud Computing – Defining Cloud Computing – NIST Definition of Cloud Computing – Cloud Computing Is a Service – Cloud Computing Is a Platform – Principal of cloud Computing – Five Essential Characteristics – Four Cloud Deployment Models – Cloud Ecosystem – Requirement for Cloud Services – Cloud Application Benefits and Drawbacks . **Cloud Computing Architecture and Management:** Learning Objectives – Preamble -Introduction - Cloud Architecture – Layer 1 (User/Client Layer) – Layer 2 (Network Layer) Layer 3 (Cloud Management Layer) – Layer 4 (Hardware Resource Layer) – Anatomy of the Cloud – network Connectivity in Cloud Computing – Public Cloud Access Networking – Intracloud Networking for Public Cloud Services – Private Intracloud Networking – New Facets in Private Networks – Path for Internet Traffic – Applications on the Cloud – Managing the Cloud Infrastructure – Managing the Cloud Application – Migrating Application to Cloud – Phases of Cloud Migration – Approaches for Cloud Migration.

---

### **UNIT II**

**Cloud Deployment Models:** Learning Objectives – Preamble – Introduction – Private Cloud – Characteristics –Suitability – On-Premise Private Cloud – Issues – Outsourced Private Cloud – Issue – Advantages – Disadvantages – Public Cloud – Characteristics – Suitability – Issue – Advantages – Disadvantages –Hybrid Cloud – Characteristics- Suitability – Issue – Advantages – Disadvantages. **Cloud Service Models:** Learning Objectives – Preamble – Introduction – Infrastructure as a Service – Characteristics of IaaS – Suitability of IaaS – Pros and Cons of IaaS – Summary of IaaS Providers – Platform as a Service – Characteristics of PaaS - Suitability of PaaS – Pros and Cons of PaaS – Summary of PaaS Providers – Software as a Service – Characteristics of SaaS - Suitability of SaaS – Pros and Cons of SaaS – Summary of SaaS Providers.

---

### **UNIT III**

**Technological Drivers for Cloud Computing:** Learning Objectives – Preamble – Introduction. **SOA and Cloud:** SOA and SOC – Benefits of SOA – Technologies Used by SOA – Similarities and Differences Between SOA and Cloud Computing – Similarities – Difference – How SOA Meets Cloud Computing – CCOA. **Virtualization:** Approaches in Virtualization – Full Virtualization – Para Virtualization – Hardware Assisted Virtualization – **Hypervisor and Its Role: Types of Virtualization:** OS Virtualization – Server Virtualization – Memory Virtualization – Storage Virtualization – Network Virtualization – Application Virtualization. **MultiCore Technology:** Multicore Processors and VM Scalability – MultiCore Technology and Parallelism in Cloud – Case Study. **Memory and Storage Technologies:** Cloud Storage Requirements – Virtualization Support Storage as a Service (STaaS) – Emerging Trends and Technologies in Cloud Storage. **Networking Technologies:** Network Requirements for Cloud

## *BCA*

–Virtualization Support Usage of Virtual Networks – DCs and VPLS – SDN –MPLS Other Emerging Networking Trends and Technologies in cloud. **Web 2.0:** Characteristics of Web 2.0 – Difference between Web 1.0 and Web 2.0 – Application of Web 2.0 – Social Media – Marketing – Education – Web 2.0 and Cloud Computing. **Web 3.0:** Components of Web 3.0 – Semantic Web – Web Services – Characteristics of Web 3.0 – Convergence of Cloud and Web 3.0 – Case Studies in Cloud and Web 3.0 – Connection Information Facebook – Search Optimization and Web Commerce: Best Buy – Understanding Text: Millward Brown. **Software Process Models for Cloud:** Types of Software Models – Waterfall Model – V Model Incremental Model – RAD Model – Agile Model – Iterative Model –Spiral Model.

---

### **UNIT IV**

**Pervasive Computing:** How pervasive Computing Work? – How Pervasive Computing Helps Cloud Computing?. **Operating System:** Types of Operating Systems – Role of OS in Cloud Computing – Features of Cloud OS – Well-Defined and Abstracted Interfaces Support for Security at the Core – Managing Virtualized Workloads – Cloud OS Requirements – Cloud-Based OS. **Application Environment:** Need for Effective ADE – Application Development Methodologies – Distributed Development – Agile Development –Power of Cloud Computing in Application Development – Disadvantages of Desktop Development – Advantages of Application development in the cloud – Cloud Application Development platforms – Windows Azure- Google App Engine – Force.com – Manjrasoft Aneka – Cloud Computing APIs – Racksapce – IBM – Intel.

---

### **UNIT V**

**Cloud Service Providers:** Learning Objectives – Preamble – Introduction – EMC IT – Captiva Cloud Toolkit – Google – Cloud platform – Cloud Storage – Google Cloud Connect – Google Cloud Print – Google App Engine – Amazon Web Services – Amazon Elastic Compute Cloud – Amazon Simple Storage Service – Amazon Simple Queue Service – Microsoft Windows Azure – Microsoft Assessment And Planning Toolkit – Share Point – IBM – Cloud Models – IBM Smart Cloud – SAP Labs –Sales Cloud – Service Cloud: Knowledge as a Service- Rackspace – VMware – Manjrasoft – Aneka Platform.

---

### **Course Outcomes:**

After completion of the course, students will be able to

- understand the main concepts, key technologies, strengths and limitations of cloud computing.
- develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- understand the core issues of cloud computing such as resource management and security.
- choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
- establish own cloud environment using openstack and work on it.
- get knowledge to work in storage management in IT field.

### **Text Book:**

Essentials of CLOUD COMPUTING by K. Chandrasekaran , 2015 , Taylor & Francis Group, CRC Press

## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
<b>VI</b>	<b>20U6CAC10</b>	<b>Basics of Big Data</b>	<b>6</b>	<b>6</b>

### **Objectives:**

- To provide an overview of an exciting growing field of big data analytics.
- To explain the Big Data Platform and its Use cases.
- To demonstrate the components of Hadoop and Hadoop Eco-System.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- reduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.

---

### **Unit I : Introduction to Big Data, Hadoop and NoSQL**

Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Case Study of Big Data Solutions - What is Hadoop? Core Hadoop Components; Hadoop Ecosystem; Physical Architecture; Hadoop limitations - What is NoSQL? NoSQL business drivers - NoSQL case studies - NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns - Using NoSQL to manage big data: What is a big data NoSQL solution? - Understanding the types of big data problems - Analyzing big data with a shared-nothing architecture - Choosing distribution models: master-slave versus peer-to-peer - Four ways that NoSQL systems handle big data problems

---

### **Unit II: MapReduce and the New Software Stack**

**Distributed File Systems** : Physical Organization of Compute Nodes, Large- Scale File-System Organization - **MapReduce**: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures - **Algorithms Using MapReduce**: Matrix-Vector Multiplication by MapReduce , Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union, Intersection, and Difference by MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Matrix Multiplication, Matrix Multiplication with One MapReduce Step.

---

### **Unit III: Finding Similar Items and Mining Data Streams**

Applications of Near-Neighbor Search, Jaccard Similarity of Sets, Similarity of Documents, Collaborative Filtering as a Similar-Sets Problem - **Distance Measures**: Definition of a Distance Measure, Euclidean Distances, Jaccard Distance, Cosine Distance, Edit Distance, Hamming Distance - **The Stream Data Model**: A Data-Stream-Management System, Examples of Stream Sources, Stream Query, Issues in Stream Processing - **Sampling Data in a Stream** : Obtaining a Representative Sample , The General Sampling Problem, Varying the Sample Size - **Filtering Streams**: The Bloom Filter, Analysis - **Counting Distinct Elements in a Stream**: The Count-Distinct Problem, The Flajolet-Martin Algorithm, Combining Estimates, Space Requirements - **Counting Ones in a Window**: The Cost of Exact Counts,

The Datar-Gionis-Indyk-Motwani Algorithm, Query Answering in the DGIM Algorithm, Decaying Windows.

---

**Unit IV: Link Analysis and Frequent Itemsets**

PageRank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: Page Rank Iteration Using MapReduce, Use of Combiners to Consolidate the Result Vector - Topic sensitive Page Rank, link Spam, Hubs and Authorities - **Handling Larger Datasets in Main Memory:** Algorithm of Park, Chen, and Yu, The Multistage Algorithm, The Multihash Algorithm - **The SON Algorithm and MapReduce - Counting Frequent Items in a Stream:** Sampling Methods for Streams, Frequent Itemsets in Decaying Windows

---

**Unit V: Clustering, Recommendation Systems and Mining Social-Network Graphs**

CURE Algorithm - Stream-Computing - A Stream-Clustering Algorithm - Initializing & Merging Buckets - Answering Queries - A Model for Recommendation Systems - Content-Based Recommendations - Collaborative Filtering - Social Networks as Graphs - Clustering of Social-Network Graphs - Direct Discovery of Communities - SimRank - Counting triangles using Map-Reduce

---

**Course Outcomes:**

After completion of the course, students will be able to

- design efficient algorithms for mining the data from large volumes.
- develop Big Data Solutions using Hadoop Eco System.
- design an efficient recommendation system and design the tools for visualization.
- identify Big Data and its Business Implications.
- understand NoSQL databases and management
- work with big data tools and its analysis techniques in IT field.

**Text Books:**

1. Anand Rajaraman and Jeff Ullman "Mining of Massive Datasets", Cambridge University Press,
2. Alex Holmes "Hadoop in Practice", Manning Press, Dreamtech Press.
3. Dan McCreary and Ann Kelly "Making Sense of NoSQL" – A guide for managers and the rest of us, Manning Press.
4. Study Material for "Big Data Analytics" based on Stanford Info-Lab Manual, Compiled by ANURADHA BHATIA, Mumbai University.

**References:**

1. Bill Franks , "Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics", Wiley
2. Chuck Lam, "Hadoop in Action", Dreamtech Press

## **BCA**

Semester	Subject code	Title of the course	Hours of Teaching / Week	No.of Credits
<b>VI</b>	<b>20U6CACP6</b>	<b>Software Lab -VI Distributed Programming using .net</b>	<b>3</b>	<b>3</b>

### **Objectives:**

- To explain the application using C#, ADO.net and ASP.net.
- To interpret with the basic and advanced features of C# language.
- To illustrate all the features of C# language and build complex web applications in .NET framework.
- To demonstrate the website by using .net
- To inculcate windows application.

### **.NET lab**

1. Working with call backs and delegates in C#
2. Code access security with C#.
3. Creating a Windows Service with C#
4. Interacting with a Windows Service with C#
5. Using Reflection in C#
6. Sending Mail and SMTP Mail and C#
7. Perform String Manipulation with the String Builder and String Classes and C#:
8. Using the System .Net Web Client to Retrieve or Upload Data with C#
9. Reader/Writer Class and C#
10. Working with Page and forms using ASP .Net.
11. Data Sources access through ADO.Net,
12. Working with Data readers , Transactions

### **Course Outcomes:**

After completion of the course, students will be able to

- develop the .NET and Java framework.
- work with the basic and advanced features of C# language.
- create applications using various data providers.
- create web application using ASP.NET.
- create mobile application using .NET compact framework.
- integrate all the features of C# language and build complex web applications in .NET framework.
- develop the website & application by using .net
- work as a .Net developer in software companies.



## *BCA*

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>VI</b>	<b>20U6CAEL3A</b>	<b>Major Elective - III MULTIMEDIA</b>	<b>5</b>	<b>4</b>

**Objectives:**

- To introduce the underlying multimedia computing architectures used for media development.
- To demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language
- To interpret history of multimedia in education.
- To teach learning theories influence the development of multimedia product.
- To illustrate the various multimedia components.

---

**Unit I**

Multimedia Overview: Introduction, Multimedia presentation and production, characteristics of a multimedia presentation, Multiple media, Utilities of multisensory perception, Hardware and software requirements, Uses of multimedia, Promotion of multimedia based contents, steps for creating multimedia presentation. Visual Display Systems: Introduction, cathode Ray Tube (CRT), Video Adapter Card, Video Adapter cable, Liquid Crystal Display (LCD), Plasma Display Panel (PDP).

---

**Unit II**

Text: Introduction, Types of Text, Unicode Standard, Font, Insertion of Text, Text compression, File Formats. Image: Introduction, Image Types, Seeing colors, color models, Basic steps for Image processing, Scanner, Digital camera, Interface Standards, Image processing software, File formats, Image output on monitor, Image output on printer.

---

**Unit III****Hrs 15**

Audio: Introduction, Fundamentals Characteristics of sound, Elements of Audio systems, Microphone, Amplifier, Loudspeaker, Audio mixer, Musical Instrument Digital Interface(MIDI),MIDI messages, MIDI connections, Sound card, Audio File format and CODECs, Software Audio Players, Audio Recording Systems, Audio and multimedia, Audio Processing software.

---

## **BCA**

### **Unit IV**

**Hrs 15**

Video: Introduction, Analog video camera, Transmission of video signals, Video signal format, Digital video, Digital Video Standards, PC Video, Video File Format and CODECs, Video editing, Video editing software.

---

### **Unit V**

**Hrs 15**

Animation: Introduction, uses of animation, key frames and Tweening, Types of animation, Computer Assisted Animation, Creating movements, Principle of animation, some Techniques of Animation, Animation on the web, 3D Animation, Special Effects, Creating Animation, Rendering algorithms, Animation software.

---

### **Course Outcomes:**

After completion of the course, students will be able to

- create a well-designed, interactive Web site with respect to current standards and practices.
- develop effective strategies to deliver quality-of-experience in multimedia applications.
- design and implement algorithms and techniques related to multimedia objects.
- design and develop multimedia applications in various domains.
- create time-based and interactive multimedia components.
- work in photogrammetric engineering field.
- work as animation creators in social media and game application developers.

### **Text Book:**

**Principles of Multimedia** by Ranjan Parekh- the Tata McGraw Hill companies, Sixth Reprint 2008.

Chapters:

- UNIT I: Chapter 1-1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9  
Chapter 3-3.1, 3.2, 3.3, 3.4, 3.5, 3.6
- UNIT II: Chapter 4-4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7  
Chapter 5-5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.13, 5.14, 5.15, 5.16
- UNIT III: Chapter 7-7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.14, 7.15, 7.19, 7.22(Up to 7.22.10), 7.23(up to 7.23.2), 7.24, 7.26, 7.28
- UNIT IV: Chapter 8-8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.10(up to 8.10.4), 8.11, 8.12
- UNIT V: Chapter 9-9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 9.11, 9.13, 9.14, 9.15, 9.16

### **Reference:**

1. **Multimedia System Design** by Prabhat K. Andleigh and Kiran Thakar-PHI-2008

## *BCA*

Semester	Subject Code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>VI</b>	<b>20U6CAEL3B</b>	<b>Major Elective – III Mobile Applications</b>	<b>5</b>	<b>4</b>

**Objectives:**

- To teach basic programming skills needed for developing mobile apps for a specific platform.
- To explain the basic concepts of Android Development tools and Life cycle.
- To impart knowledge about user interfaces.
- To interpret about databases and content providers.
- To illustrate implementation of android application with multimedia support.

---

**Unit – I**

Android Introduction: An Open Platform for Mobile Development – Native Android applications – Android SDK features – Evolution- development of android for mobile – Development framework

---

**Unit – II**

Android application development: installation – Creating application – Types of Applications – Android development tools. Creating Applications and activities: Application Manifest file – Manifest editor – Externalizing the resources – Android application life cycle – Android application class- android activities

---

**Unit – III**

Building user interfaces: Fundamental UI Design – Layouts – Fragments – Widget Tool box – Creating new views

---

**Unit – IV**

Introducing adapters-Databases and content providers: Android databases- working with SQLite databases-Creating content providers-Native android content providers

---

**Unit - V**

Introducing the Action Bar – Creating and Using Menus and Action bar action items- Introducing Dialogs-Introducing notifications- signing and publishing application.

---

**Course Outcomes:**

After completion of the course, students will be able to

- understand the right user interface for mobile application.
- implement mobile application using ui toolkits and frameworks.
- design a mobile application that is aware of the resource constraints of mobile devices.
- implement android application to use telephony for SMS communication.
- work on develop web based mobile application that accesses internet and location data.
- develop web based mobile application as mobile application developer.

## ***BCA***

### **Books for Study**

1. Reto Meier, **“Professional Android 4 Application Development”**, WROX Publication – Wiley – India, 2012

### **Books for Reference:**

1. Pradeep Kothari & Kogent Learning Solutions Inc, **“Android Application Development Black Book”**, Dreamtech Press, Edition 2014, ISBN: 978 – 93 – 5119 – 409 – 5
2. W. Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz, **“Android in Action”**, Manning Publications Co, Third Edition, ISBN 9781617290508.
3. Lauren Darcey, Shane Conder, **“SAMS Teach Yourself Android Application Development in 24 Hours”**, Second edition.

### **BCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>VI</b>	<b>20U6CAEL4PA</b>	<b>Major Elective - IV MULTIMEDIA LAB</b>	<b>4</b>	<b>3</b>

#### **Objectives:**

- To demonstrate work with all aspects of text, audio, images and video.
- To interpret instructional and informational media (print materials, audio/visual materials and/or web-based materials etc.)
- To explain characteristics of rendering 3D objects for optimal system processing and analysis.
- To provide various multimedia authoring tools.
- To illustrate the basic 3D models and animations.

- 
1. Creating a sample Image
  2. Editing existing image's brightness, mode, color and add and edit layer style
  3. Stitch and Edit two images into single image. Use selection tools Lasso tool, Clone stamp
  4. Study about timeline concepts. Insert text, image, use scaling rotation alignment
  5. Study masking concepts. Use audio in the movie.
  6. Add buttons, menus, and actions to the movie.
  7. Export movie, Use multiple scenes.
  8. Insert text, image, and sprite to the movie.
  9. Add effects to the text(predefined and user defined)
  10. Create simple 3D animation and export

#### **Course Outcomes:**

After completion of the course, students will be able to

- gain knowledge of creating and working with digital images and to manipulate them.
- work with all aspects of text, audio, images and video;
- develop a presentation package using multimedia tools.
- create basic 3d models and animations.
- design and create interactive multimedia products.
- analyze instructional and informational media (print materials, audio/visual materials and/or web-based materials, games/simulations, etc.)
- develop the online game software and working capability in social media.
- work in photogrammetric engineering field.

### **BCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>VI</b>	<b>20U6CAEL4PB</b>	<b>Major Elective - IV Mobile Applications LAB</b>	<b>4</b>	<b>3</b>

#### **Objectives:**

- To provide depth programming knowledge in Mobile Lab.
- To impart web based mobile application that accesses internet and location data.
- To demonstrate implementation of android application with multimedia support.
- To interpret design the right user interface for mobile application.
- To introduce the programs using SQLite.

---

#### **Mobile:**

1. Layouts
2. Views
3. Events
4. Files
5. Preferences
6. Notifications
7. Programs using SQLite
8. Audio and Video Applications

#### **Course Outcomes:**

After completion of the course, students will be able to

- design the right user interface for mobile application.
- implement mobile application using UI toolkits and frameworks.
- design mobile applications that are aware of the resource constraints of mobile devices.
- develop web based mobile application that accesses internet and location data.
- implement android application to use telephony for SMS communication and multimedia support.
- implement android application design android application using layouts, buttons and widgets.
- working capability for software developing in the IT field
- get job in IT industry as mobile app developer.