

# **Programme Project Report (PPR)**

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## **Bachelor of Computer Applications (BCA/BCA – LE) - Semester Pattern**



**School of Computer Science**

**TAMIL NADU OPEN UNIVERSITY**

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**TAMIL NADU OPEN UNIVERSITY**  
**School of Computer Science**  
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**Bachelor of Computer Applications (BCA/ BCA-LE)**  
**Programme Project Report (PPR)**  
**(From Academic Year 2021-22 onwards)**

**Programme's Mission & Objectives :**

- To impart knowledge and skills in such a way that a learner function effectively in a dynamic technological era.
- To produce effective knowledge workers, practitioners who will be guided by vision, compassion, knowledge, discipline, discovery with deep respect for human values.
- To enable the learners to acquire rich knowledge and sound skills in core areas of computer applications.
- To facilitate the development and application of problem-solving skills in students. Develops critical thinking, analytical ability and creative skills.
- To acquire highly professionals knowledge in the concerned areas and convert demographic advantage to a knowledge and skill based society.

**Relevance of the program with HEI's Mission and Goals:**

Literacy and level of education are basic indicators of the level of development achieved by a society. Literacy forms an important input in overall development of individuals enabling them to comprehend their social, political and cultural environment better and respond to it appropriately. Higher levels of education and literacy lead to a greater awareness and also contributes in improvement of economic and social conditions. It acts as a catalyst for social upliftment enhancing the returns on investment made in almost every aspect of development effort such as employment of weaker sections of the society environmental etc.

B.C.A. programme offered through distance mode creates an avenue to acquire knowledge and skills on the domain courses. The courses have been identified to enable the learners to opt by horizontal mobility at the entry level. For this purpose, a wide range of options of the courses have been offered to cater to the needs. The structure of the programme meets the benchmark of similar programmes in conventional system of education.

**Nature of prospective target group of learners:**

Students, who passed 10+2 or equivalent, are eligible to enroll for B.C.A. Basic level of understanding and general aptitude in the information technology will entitle the students to pursue and excel in B.C.A. The programme is structured to gradually improve the capability of

the students in the field of computers and information technology. It also attracts young minds to the potentially rich & employable field of computer applications.

**Appropriateness of programme to be conducted in ODL mode to acquire specific skills and competence:**

B.C.A programme through distance education can be able to spread more literacy in the society and reaching the unreached to upgrade their education skills. The structure of the programme meets the benchmark of similar programmes in conventional system of education. Programme syllabus is designed to enlighten on the basics of computer organization, programming, Data Base and Networking with ease of Self-study mode. The course needs only reasonable reading and grasping aptitude of students, to take up, to study and to groom as computer professional.

**Instructional Design**

The Curriculum and the Syllabus for Bachelor of Computer Applications Degree Programme has designed by covering all the aspects of latest technology in Computer Science. The duration of the BCA Programme is three years & BCA-LE is two years and the medium of instruction is English.

The Bachelor of Computer Applications Degree Programme is offered through the Learner Support Centres established by TNOU in the affiliated Arts and Science College, where the same Programme is offered through Conventional Mode.

The Faculty Members available at School of Computer Science of Tamil Nadu Open University and the faculties approved as Academic Counselors of TNOU at Learner Support Centres will be used for delivering the Bachelor of Computer Application Degree Programme

The credits systems suggested as per UGC-ODL Regulations-2020 have been assigned to Bachelor of Computer Applications Degree Programme in English. The total number of credit assigned for the Programme is 112. The Self Learning Materials in the form of print, e-content and audio/video materials wherever required has also been developed for the Programme.

**Procedure for admissions, curriculum transaction and evaluation:**

**Eligibility:** The eligibility for Admission to the Bachelor of Computer Application Degree Programme is +2 pass or its equivalent. The eligibility for Admission to the Bachelor of Computer Application – Lateral Entry degree programme is any Diploma from recognized

Polytechnic College. The Programme Fee is Rs.27,000/- for three years, (18,000/- for LE) plus Registration and other Charges. The admissions are carried out by Tamil Nadu Open University through Online and Offline through its Regional Centres located within the State of Tamil Nadu. The Theory Counselling and the Practical Counselling (if any) will be conducted through the Learners Support Centres of Tamil Nadu Open University. The evaluation will be carried by Tamil Nadu Open University consists of Continuous Internal Assessment through Assignment and External Assessment through Term End Examination.

**Financial Assistance:** SC/ST Scholarship available as per the norms of the State Government of Tamil Nadu. Complete Admission fee waiver for the physically challenged/ differently abled persons.

**Policy of Programme delivery:** The Academic Calendar for the Programme will be available for the learners to track down the chronological events/ happenings. The Counselling schedule will be uploaded in the TNOU website and the same will be intimated to the students through SMS.

**Evaluation System:** Examination to Bachelor Degree Programme in Computer Applications is designed to maintain quality of standard. Theory will be conducted by the University in the identified Examination Centres. For the assignment, students may be permitted to write with the help of books/materials for each Course, which will be evaluated by the Evaluators appointed by the University.

**Internal Continuous Assessment:** 1 assignment for 2 credits is to be prepared by the learners. E.g. If a Course is of Credit 4, then 2 number of Assignments are to be written by the learner to complete the continuous assessment of the course. Assignment carries 30 marks, consists of Short Answer Questions (150 words) and Long Answer Questions (450 words) for each Course.

Section A	Three Short-Answer Questions [Each 5- Marks]	3 x 5 = 15 Marks
Section B	One Long Answer Question [10-Marks]	1 x 15 = 15 Marks
<b>Total</b>		<b>30 Marks</b>

**Theory Examination:** Students shall normally be allowed to appear for theory examination after completing the Assignments. The Term -End Examination shall Carry 70 Marks and the Question Paper has three Sections: A, B & C for the duration of 3 hours.

## Question Pattern for Theory Examinations:

Max. Marks: 70

Time: 3 hours

PART - A ( $5 \times 2 = 10$  marks)  
Answer all FIVE questions in 50 words  
[All questions carry equal marks]

- From Block - I
- From Block - II
- 
- Block - III
- From Block - IV
- From Block- V

From

PART - B ( $4 \times 5 = 20$  marks)  
Answer any FOUR questions out of Seven questions in 150 words  
All questions carry equal marks

- From Block - I
- From Block - II
- From Block – III
- From Block - IV
- From Block- V
- From any Block
- From any Block

PART - C ( $4 \times 10 = 40$  marks)  
Answer any FOUR questions out of Seven questions in 400 words  
[All questions carry equal marks]

- From Block - I
- From Block - II
- From Block - III
- From Block - IV
- From Block- V
- From any Block
- From any Block

**Passing Minimum:**

For theory examination: The candidate shall be declared to have passed the theory examination if the candidate secures not less than 25 marks in the Term End Examinations (TEE) in each theory paper and secures not less than 13 marks in the Continuous Internal Assessment (CIA) [The mark distributions will be adhere as per TNOU norms time to time] and overall aggregated marks is 40 marks in both external and internal taken together. The Candidate must secure the minimum aggregated total of 40 marks for passing in the each course.

Continuous Internal Assessment (CIA)		Term End Examination (TEE)		Overall Aggregated Marks	Maximum Marks
Minimum Mark	Maximum Mark	Minimum Mark	Maximum Mark	CIA + TEE	
13	30	25	70	40	100

For practical examination: The candidate shall be declared to have passed the practical examination if the candidate secures not less than 25 marks in the practical examinations in each practical course and secures not less than 13 marks in the Continuous Internal Assessment (CIA) and overall aggregated marks is 40 marks in both external and internal taken together. The Candidate must secure the minimum aggregated total of 40 marks for passing in the each course. However submission of record notebook is a must.

Continuous Internal Assessment (CIA)		Practical Examination (PE)		Overall Aggregated Marks	Maximum Marks
Minimum Mark	Maximum Mark	Minimum Mark	Maximum Mark	CIA + PE	
13	30	25	70	40	100

**Practical:** The following pattern is prescribed for practical courses for Bachelor of Computer Application (B.C.A.).

S.NO	Activities	Marks
1	Writing the Program	20
2	Compiling the Program	20
3	Running the Program	10
4	Record Work	10
5	Viva	10
	<b>Total</b>	<b>70</b>

### **Mini Project:**

The objective of the Mini Project is to enable the students to work in convenient groups of not more than four members on a project with a Latest Software. The mini project work will be evaluated for 100 marks. The 100 marks is awarded for Evaluation of the Project. The passing minimum in the mini project work is 50% of the total mark. i.e. the student should get minimum 50 marks out of 100 marks in the mini project evaluation.

### **Classification of Successful Candidate:**

Candidates who pass all the courses prescribed and who secure

- 75% and above (in first attempt only) will be placed in the *First class with Distinction*.
- 60% and above in the aggregate of marks will be placed in the *First Class*.
- 50% and above but below 60% in the aggregate will be placed in the *Second Class*.
- All other successful candidates will be placed in the *Third Class*.

### **Requirement of laboratory and Library Resources:**

The Programme will be offered through the Learner Support Centre (LSC) maintained by Tamil Nadu Open University. The LSC's have the required infrastructural facilities to conduct the Counselling for the students who wish clear their doubts and also they are having well equipped laboratory facilities relevant to the Bachelor Degree Programme in Computer Applications.

A well equipped Library is available in the University Head quarters with about 24,000 books and lot of research journals. The learner Support Centre through which the Degree Programme is to be offered is also equipped with a full-fledged library having books and Journals.

### **Cost Estimate of the Programme and the Provisions**

The cost estimate for development, delivery and maintenance of the Bachelor of Arts Degree Programme in Tamil is provided in the following Table.

<b>S.No.</b>	<b>Details</b>	<b>Amount in Rs.</b>
1	Programme development and launching cost (Expenditure)	-30,77,370
2	Programme Fee charged for 3 years per student (Income)	27,000
3	Examination Fee charged for 3 years (Income) per student	9,000
4	Examination expenses per student for 3 years per student (Expenditure)	- 3,600

**Quality Assurance Mechanism & Programme Outcomes:** The Quality of the Bachelor Degree Programme in Computer Applications is maintained by adopting the curriculum suggested by the UGC. As per UGC guidelines the core courses, three elective courses, three subject specific elective courses, two practical courses are included in the Programme. As a part of Quality assurance, the curriculum for the Programme will be updated once in three years. Accordingly, the curriculum is updated and approved by Board of Studies held on 16-06-2020. Necessary steps are being taken to obtain the feedback from the students and the Academic Counsellors who are part of the Programme for effective delivery of the Programme.

**Programme Outcomes:**

After successful completion of Bachelor of Computer Applications, a student shall be able to:

PO1: Transform complex computing tasks into solvable parts of problem, investigate, develop solutions and propose integrated solutions using emerging technologies.

PO2: Develop an effective helping relationship with people in order to ensure better results through combined knowledge, abilities and Communicate effectively with the society through effective oral documentations and presentations

PO3: Identify, deep drive analyze, interpret and to formulate complex solutions using to various computing domains.

PO4: Augment broad knowledge across various fields of computer in global technological development.

PO5: Work as a member or leader in various teams and organize to excel for team progress in multidisciplinary situation.

PO6: Improve technical and technological knowledge in diverse areas of computer and enhancing competencies, skills for high carrier orientation and entrepreneurship.

# MODEL PROGRAMME STRUCTURE

## Bachelor of Computer Applications and Lateral Entry

### Distance Mode – Semester Pattern

Part	Name of the Course	Title of the Course	Course Code	Credit	Examination		
					Marks Distribution		Maximum Marks
					CIA*	TEE#	
<b>1<sup>st</sup> YEAR</b>							
<b>Semester - I</b>							
I	Language	Tamil or other language - I	BFTMS-11	3	30	70	100
II	Language	Foundation in English - I	BFEGS-11	3	30	70	100
III	Core - I	Problem Solving Techniques	BCAS-11	4	30	70	100
	Core-II	Information Technology Essentials	BCAS-12	4	30	70	100
	Ancillary - I	Allied Mathematics - I	BMSSA-11	3	30	70	100
IV	Core- Practical I	Office Automation Laboratory	BCAS -P1	2	30	70	100
<b>Semester - II</b>							
I	Language	Tamil or other language - II	BFTMS-21	3	30	70	100
II	Language	Foundation in English - II	BFEGS-21	3	30	70	100
III	Core - III	Programming in C	BCAS-21	4	30	70	100
	Core-IV	Open Source Technology	BCAS-22	4	30	70	100
	Core-V	Digital Logic	BCAS-23	4	30	70	100
	Core Practical-II	C Programming Laboratory	BCAS-P2	2	30	70	100
<b>2<sup>nd</sup> YEAR</b>							
<b>Semester - III</b>							
III	Core-VI	Programming Using C++	BCAS-31	4	30	70	100
	Ancillary- II	Allied Mathematics-II	BMSSA-22	3	30	70	100
	Core -VII	Data Structures	BCAS-32	4	30	70	100
	Core Practical III	C++ Laboratory	BCAS-P3	2	30	70	100
	Core Practical IV	Data Structures Laboratory	BCAS-P4	2	30	70	100
IV	Elective	Environmental Studies	CCE	2	30	70	100
<b>Semester - IV</b>							
III	Core-VIII	Operating Systems	BCAS-41	4	30	70	100
	Core-IX	Data Base Management Systems	BCAS-42	4	30	70	100
	Core - X	Web Designing	BCAS-43	4	30	70	100
	Core -XI	Software Engineering	BCAS-44	4	30	70	100
	Core Practical V	Web Designing Laboratory(HTML/DHTML/CSS)	BCAS-P5	2	30	70	100
	Core Practical - VI	Data Base Management System	BCAS-P6	2	30	70	100

		Laboratory					
<b>3<sup>rd</sup> YEAR</b>							
<b>Semester - V</b>							
III	Core -XII	Data Communication & Networking	BCAS-51	4	30	70	100
	Core-XIII	Programming in Java	BCAS-52	4	30	70	100
	Core-XIV	Programming in Python	BCAS-53	4	30	70	100
	Core Practical-VII	Programming in Java - Laboratory	BCAS-P7	2	30	70	100
	Core Practical - VIII	Programming in Python - Laboratory	BCAS-P8	2	30	70	100
IV	Elective	Generic Elective-1	GE-1	2	30	70	100
<b>Semester – VI</b>							
III	Core-XV	Visual Programming	BCAS-61	4	30	70	100
	Core Practical -IX	Visual Programming Laboratory	BCAS-P9	2	30	70	100
	Project Work	Mini Project	BCAS-P10	2	30	70	100
IV	Elective	Elective- I**	CBCS (Student Choice)	3	30	70	100
	Elective	Elective –II**	CBCS (Student Choice)	3	30	70	100
	Elective	Generic Elective-2	GE-2	2	30	70	100
<b>Total Credits for BCA = 110 &amp; BCA - LE - 71 Total Marks = 3600</b>							
* Generic Elective papers list given by the university							
* <i>Continuous Internal Assessment (CIA)</i>							
# <i>Term End Examination (TEE)</i>							
** <i>Any one from the list of respective electives</i>							
<i>Non-Major Elective Courses for other Discipline Students</i>							
1. <i>Information Technology Essentials-BCAS-12</i>							
2. <i>Office Automation – BCAS-13</i>							
<b>Core and Elective Courses:</b>							
1.	Core Courses	– Core theory papers – I, II, III, IV, V, VI, VIII, XI, XIV Core Practicals – I, II, IV, VI, VIII					
2.	Ability Enhancement Compulsory Courses (AECC)	– (i) Foundation in English - I (ii) Foundation in English - II					
3.	Skill Enhancement Courses (SEC)	– Core Practicals- III, V, VII, IX					
4.	Non-Major Elective (NME)	– Candidates may choose one paper from the list given by the University					
5.	Discipline Specific Elective (DSE)	– Core theory papers –VII, IX, X, XII, XIII, XV.					

## LIST OF ELECTIVES

Course Code	Course Name
<b>ELECTIVE – I</b>	
BCAPE-01	Principles of Management
BCAPE-02	Management Information Systems
BCAPE-03	Professional Ethics
BCAPE-04	Constitution of India
<b>ELECTIVE – II</b>	
BCAPE-05	E- Learning
BCAPE-06	Big Data Analytics
BCAPE-07	Financial Accounting
BCAPE-08	Data Mining

### **Programme Outcomes:**

After successful completion of Bachelor of Computer Applications, a student shall be able to:

- PO1: Transform complex computing tasks into solvable parts of problem, investigate, develop solutions and propose integrated solutions using emerging technologies.
- PO2: Develop an effective helping relationship with people in order to ensure better results through combined knowledge, abilities and Communicate effectively with the society through effective oral documentations and presentations
- PO3: Identify, deep drive analyze, interpret and to formulate complex solutions using to various computing domains.
- PO4: Augment broad knowledge across various fields of computer in global technological development.
- PO5: Work as a member or leader in various teams and organize to excel for team progress in multidisciplinary situation.
- PO6: Improve technical and technological knowledge in diverse areas of computer and enhancing competencies, skills for high carrier orientation and entrepreneurship.











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Chennai – 15

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**B. C. A. SYLLABUS - I YEAR (I SEMESTER)**

<b>COURSE TITLE</b>	<b>:</b>	<b>Foundation in English-I (Literature and Grammar)</b>
<b>COURSE CODE</b>	<b>:</b>	<b>BFEGS-11</b>
<b>COURSE CREDIT</b>	<b>:</b>	<b>3</b>

**Course Objectives**

While studying the Foundation in English –I course, the student can able to:

CO1: Make the learners aware of the history of England

CO2: Cultivate the creativity among the learners

CO3: Improve the reading skills of the learners

CO4: Enhance the vocabulary of the learners

CO5: Make the learners read and write in English

**Block-1 Brief History of England**

Tudor England- Stuart England -Restoration England -Revolutions -Eighteenth Century-19<sup>th</sup> Century Education- 20<sup>th</sup> Century

**Block 2 Literary Texts**

R.K. Narayan- *An Astrologer's Day* and Sarojini Naidu - *Bangle Sellers*

**Block-3 Reading Comprehension**

Definition of Comprehension- Types of Comprehension- Reading Materials-Vocabulary- Critical Reading- Effective Reading- Exercises

**Block -4 Functional Grammars and Vocabulary**

Parts of Speech- Tenses-Articles -Prepositions and Linkers –Punctuation-Common Mistakes - Polite Expression-Affixes

**Block-5 Language Skills**

Reading Skills: SQ3R Technique -Writing Skills -Dictionary Use.

**References:**

1. Narayan R.K. *Short Story Collections*.
2. Sarojini Naidu. *Bangle Sellers*

3. Sinha C.A. Reading Comprehension. Prabhat Prakashan.
4. Xavier A.G. *An Introduction to the Social History of England*. Viswanathan S. Printers, Chennai. 2009.

**Web Resources:**

1. <https://www.digimat.in/nptel/courses/video/109106124/L01.html>
2. <https://www.digimat.in/nptel/courses/video/109106138/L46.html>
3. <https://www.coursera.org/lecture/multimodal-literacies/9-2-learning-to-read-reading-for-meaning-HdG3O>
4. <https://nptel.ac.in/courses/109/107/109107172/>

**Course Learning Outcomes**

After completion of the Foundation in English –I Course, the learners will be able to:

CLO1: Describe the history of England

CLO2: Critically analyze the literary texts

CLO3: Use the words correctly

CLO4: Write in flawless English

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**B. C. A. SYLLABUS - I YEAR (I SEMESTER)**

**COURSE TITLE : Problem Solving Techniques**

**COURSE CODE : BCAS-11**

**COURSE CREDIT : 4**

**COURSE OBJECTIVES**

While studying the Problem Solving techniques, the student shall be able to:

CO1: Demonstrate the different types of problems

CO2: Develop different games and predict the winning strategies.

CO3: Acquire Knowledge about Algorithms that Involve a Simple Repetitive Process

CO4: Describe the need for problem Formulation and Solution

CO5: Construct the bridge problem.

**BLOCK I: INVARIANTS**

Invariants – Chocolate-bar Problem – Empty-box Problem – Tumbler Problem – Tetrominoes – Goat-cabbage-wolf Problem - Brute-force Search – State-space Explosion – Abstraction – Nervous-couples Problem - Denoting States and Transitions – Rule of Sequential Composition – Bridge Problem – Conditional Statements.

**BLOCK II: GAMES**

Games – Matchstick Game – Winning Strategies – Subtraction-set Games - Sums of Games – Knights and Knaves – Logic Puzzles - Calculational Logic – Equivalence and Continued Equalities – Negation.

**BLOCK III: INDUCTION**

Induction – Black and White Colouring – Cutting the Plane – Triomino Problem - Looking for Patterns – The Need for Proof – From Verification to Construction.

**BLOCK IV: PROBLEM FORMULATION AND SOLUTION**

Fake-Coin Detection – Problem Formulation – Problem Solution – Tower of Hanoi Problem - Specification and Solution –Inductive Solution – Iterative Solution - Principles of Algorithm Design – Iteration. Invariants and Making Progress – Sam Loyd's Chicken-Chasing Problem.

## **BLOCK V: BRIDGE PROBLEM**

Bridge Problem – Lower and Upper Bounds – Outline Strategy - Regular Sequences – Sequencing Forward Trips – Choosing Settlers and Nomads- Knight’s Circuit – Straight-Move Circuits – Super Squares – Partitioning the Board.

### **Reference book:**

1. Roland Backhouse, “Algorithmic Problem Solving”, 2011 John Wiley & Sons Ltd.

### **Web Links**

1. <https://www.youtube.com/watch?v=bZXDGQSuF9I>
2. <https://www.youtube.com/watch?v=Ahha-igVmJw>

## **COURSE LEARNING OUTCOMES**

After completion of the Problem solving techniques, the student can able to:

CLO1: Reveal the different types of problems.

CLO2: Construct different games and predict the winning strategies.

CLO3: Acquire Knowledge about Algorithms that Involve a Simple Repetitive Process

CLO4: Describe the need for problem Formulation and Solution

CLO5: Identify the bridge problem.

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**B. C. A. SYLLABUS - I YEAR (I SEMESTER)**

**COURSE TITLE** : **Information Technology Essentials**  
**COURSE CODE** : **BCAS-12**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Information technology essentials course, the student shall be able to:

- CO1: Memorize the basics of computers
- CO2: Demonstrate the classification of software
- CO3: Enumerate the various types of software and operating systems
- CO4: Observe the concepts of Networking and various types of LAN
- CO5: Recognize the concepts of Internet and WWW.

**BLOCK I: INTRODUCTION TO COMPUTER CONCEPTS**

Definition – Importance – History – Classification – Benefits & Limitations - Software - Application Software – System Software - Computer Architecture – I/O Unit – CPU – Memory unit – Memory System – Memory hierarchy.

**BLOCK II: SOFTWARE CONCEPTS**

Classification of Software – System Software – application Software - Operating System: Types of Operating System – Functions of Operating System

**BLOCK III: SOFTWARE TOOLS**

Software Tools – Application Generator – Software Engineering & CASE Tools – System Software Utilities – Windows - General Purpose Application Software – Special Purpose Application Software.

**BLOCK IV: NETWORKING**

Communication – Networking – Types of Networks – Components of Networks –Standard Topologies - Network Operating System: Concepts – Client Software – Server Software - LAN Expansion – Repeaters – Routers – Bridges – Gateways.

## **BLOCK V: INTERNET & WWW**

Internet – functions – internet capabilities – Information retrieval on the internet - WWW – WebPages and HTML - Web browsers - Internet Benefits to Organization – Problem on the Internet.

### **Reference Books:**

1. Fundamentals of Information Technology, S.K. Bansal, A P H Publishing Corporation, 2002
2. Introduction of Information Systems, Alexis Leon, Mathews Leon, Vijay Nicole, imprints, Pvt. Ltd, 2004.

### **Web Links**

1. <https://arrow.tudublin.ie/cgi/viewcontent.cgi?article=1003&context=schmuldissoft>
2. <https://homepage.cs.uri.edu/faculty/wolfe/book/Readings/Reading05.htm>.
3. [http://engineering.futureuniversity.com/BOOKS%20FOR%20IT/William%20Stallings%20-%20Operating%20Systems%20\(1\).pdf](http://engineering.futureuniversity.com/BOOKS%20FOR%20IT/William%20Stallings%20-%20Operating%20Systems%20(1).pdf)
4. [https://www.guru99.com/operating-system-tutorial.html#:~:text=An%20Operating%20System%20\(OS\)%20is,run%20and%20perform%20its%20tasks.](https://www.guru99.com/operating-system-tutorial.html#:~:text=An%20Operating%20System%20(OS)%20is,run%20and%20perform%20its%20tasks.)

## **COURSE LEARNING OUTCOMES**

After completion of the Information technology essentials course, the student can be able to:

- CLO1: Acquire the basic of knowledge of computer concepts
- CLO2: Identify the classification of software
- CLO3: Demonstrate the various types of software and operating systems
- CLO4: Illustrate the concepts of Internet and WWW.
- CLO5: Observe the concepts of Networking and various types of LAN.

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**B. C. A. SYLLABUS - I YEAR (I SEMESTER)**

**COURSE TITLE** : **Allied Mathematics – 1**  
**COURSE CODE** : **BMSSA-11**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Allied Mathematics – 1, the Learner shall be able to:

- CO1: Provide basic Mathematical concepts of Matrices.
- CO2: Enumerate the differential calculus.
- CO3: Evaluate the Differential Equations.
- CO4: Identify the Fourier Series
- CO5: Construct the Linear Programming Problem

**BLOCK – I: Properties of Matrices**

- 1.1 Eigenvalues and Eigenvectors
- 1.2 Cayley Hamilton Theorem
- 1.3 Similar Matrices
- 1.4 Diagonalization of Matrices possessing Distinct Eigenvalues
- 1.5 Eigenvalues for symmetric matrices

**BLOCK -II:Differential Calculus**

- 2.1 Higher Derivatives – n<sup>th</sup> derivative – Standard Results
- 2.2 Trigonometric Transformations
- 2.3 Formation of Equations Involving Derivatives
- 2.4 Liebnitz's formula for n<sup>th</sup> derivative – Problems involving Liebnitz's formula
- 2.5 Methods of Integration of functions of the Following Types:

$$\frac{1}{(x+p)\sqrt{ax^2+bx+c}} ; \sqrt{(x-a)(b-x)} ; \frac{1}{\sqrt{(x-a)(b-x)}} ; \sqrt{\frac{(x-a)}{(b-x)}}$$

**BLOCK-III: Differential Equations**

- 3.1 Partial Differential Equation
- 3.2 Formation of Equations by Elimination of Constants and an Arbitrary Function

- 3.3 Definition of General, Particular, Complete and Singular Integral
- 3.4 Solutions of First Order Equations in their Standard Forms
- 3.5 Lagrange's Method of Solving of Linear Equations  $Pp \square Qq \square R$

#### **BLOCK-IV: Fourier Series**

- 4.1 Definition of Fourier Series
- 4.2 Finding Fourier Coefficients for a given Periodic Function with Period  $2 \square$
- 4.3 Odd and Even Functions
- 4.4 Half - Range Series
- 4.5 Development in sine and cosine series

#### **BLOCK-V: Linear Programming Problem**

- 5.1 Formulation of LPP
- 5.2 Graphical Method
- 5.3 Simplex Method

#### **BOOKS FOR STUDY**

1. Narayanan, S., Hanumantha Rao and T.K. Manicavachagam Pillai, *Ancillary Mathematics – Volume - I*. Madras.:Viswanathan, S, 2012.

Chapter 3: Sections 3.4, 3.5

Chapter 6: Sections 6.1

2 Narayanan S., R. Hanumantha Rao,T.K. Manicavachgam Pillay, and P. Kandaswamy.

3 *Ancillary Mathematics – Volume – II*. Madras.: Viswanathan, S, 1995 Reprint 2011.

Chapter 1: Sections 8 (cases 5-9)

Chapter 2: Sections 1 - 5

Chapter 6: Sections 1-3, 5, 6.

4. Kalavathy S, *Operations Research*, Vikas Publishing House, Noida, Fourth Edition 2013

Chapter 2: Sections 2.1, 2.2

Chapter 3: Sections 3.1 – 3.3

Chapter 4: Sections 4.1, 4.2

#### **BOOKS FOR REFERENCE**

1. Joseph, Edwards, *An Elementary Treatise on the Differential Calculus*, London: Macmillan, 1948.

2. Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume I*.
3. Madras.: Viswanathan, S., 2006.
4. Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume II*.  
Madras.: Viswanathan, S., 2004.
5. Singaravelu A., *Allied Mathematics, Chennai*: Meenakshi, 2010
6. Sundaresan V., K.S. Ganapathy Subramanian, K. Ganesan. *Resource Management Techniques*, 4<sup>th</sup> ed. Arakkam: A.R. Publications, 2007.

### **Web Links**

1. <https://www.youtube.com/watch?v=jqU0q21PHEQ>
2. <https://www.youtube.com/watch?v=6o7b9yyhH7k>
3. [https://www.youtube.com/watch?v=LGxE\\_yZYigI](https://www.youtube.com/watch?v=LGxE_yZYigI)
4. [https://www.analyzemath.com/linear\\_programming/linear\\_prog\\_applications.html](https://www.analyzemath.com/linear_programming/linear_prog_applications.html)

### **COURSE LEARNING OUTCOMES**

After completion of the Allied Mathematics – 1, the Learner will be able to:

CLO1: Recognize the basic Mathematical concepts of Matrices.

CLO2: Identify the differential calculus.

CLO3: Develop the Differential Equations.

CLO4: Create the Fourier Series

CLO5: Construct the Linear Programming Problem.

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**B. C. A. SYLLABUS - I YEAR (I SEMESTER)**

**COURSE TITLE** : **Office Automation Laboratory**  
**COURSE CODE** : **BCAS-P1**  
**COURSE CREDIT** : **2**

**COURSE OBJECTIVES**

While studying the Office Automation Laboratory course, the student shall be able to:

- CO1: Describe the professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools
- CO2: Enumerate the students in preparation of documents and presentations with office automation tools.

**I. MS-WORD**

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text
2. Bio data: Prepare a Bio-data.
3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.

**II. MS-EXCEL**

1. Data sorting-Ascending and Descending (both numbers and alphabets)
2. Mark list preparation for a student
3. Individual Pay Bill preparation.
4. Invoice Report preparation.

**III. MS-POWERPOINT**

1. Create a slide show presentation for a seminar.
2. Preparation of Organization Charts

3. Create a slide show presentation to display percentage of marks in each semester for all students
  - a. Use bar chart (X-axis: Semester, Y-axis: % marks).
  - b. Use different presentation template different transition effect for each slide.

### **Web Links**

1. <https://www.youtube.com/watch?v=zRBXIBYQ0z8>
2. <https://www.youtube.com/watch?v=bUIeN-hk-3s>
3. [https://onlinecourses.nptel.ac.in/noc22\\_mg35/preview](https://onlinecourses.nptel.ac.in/noc22_mg35/preview)

### **COURSE LEARNING OUTCOMES**

After completion of the Office Automation Laboratory course, the student can be able to:

CLO1: Perform documentation

CLO2: Perform accounting operations

CLO3: Perform presentation skills

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**B. C. A. SYLLABUS - I YEAR (I SEMESTER)**

**COURSE TITLE** : **Foundation in English-II (Literature and Use of English)**  
**COURSE CODE** : **BFEGS-21**  
**COURSE CREDIT** : **3**

**Course Objectives**

While studying the Foundation in English-II course, the student shall be able to:

- CO1: Cultivate the creativity among the learners
- CO2: Improve the reading skills of the learners
- CO3: Enhance the vocabulary of the learners
- CO4: Develop pronunciation skills
- CO5: Imbibe the use of internet for developing language skills

**Block-1 Literary Texts**

Rabindranath Tagore's *Sacrifice* and John Donne's *The Sun Rising*

**Block- 2 Reading Comprehension**

Reading passages-Preparing a glossary from passage- reading the meaning- respond to questions

**Block- 3 Vocabulary and Grammar**

Synonyms and Antonyms- Homophones-Making of Nouns-Making of Adjectives-Compound Words-Phrases and Idioms-Words often confused-Spelling- Tenses

**Block-4 Pronunciation and Spoken English**

Importance of English-Pronunciation: An Exposition-Speech Sounds-Sounds and Spelling: The Relationship-Attributes of Good Speech-Dialogue Situations/ Situational Dialogues

**Block-5 The Internet English**

Email-Chat Groups-Virtual Words-The Web-Commentary

## **References:**

1. *Balasubramanian T. English Phonetics for Indian Students - A Workbook.* 2016.
2. Daniel Jones. *Cambridge English Pronouncing Dictionary.* Cambridge University Press, 2011.
3. Tagore, Rabindranath. *Sacrifice and Other Plays.* Niyogi Books, 2012.

## **Web Resources:**

1. <https://www.poetryfoundation.org/podcasts/75363/the-sun-rising>
2. <https://nptel.ac.in/courses/109/103/109103135/>
3. <https://nptel.ac.in/content/storage2/courses/109106085/downloads/03-%20Phonetics%20and%20Phonology-%20week%203.pdf>
4. <https://nptel.ac.in/courses/109/106/109106085/>
5. <https://nptel.ac.in/courses/109/107/109107172/>

## **Course Learning Outcomes**

After successful completion of the Foundation in English-II Course, the learners will be able to:

CLO1: Critically evaluate the literary texts

CLO2: Read the passages effectively

CLO3: Speak with good accent

CLO4: Communicate through online

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### **B. C. A. SYLLABUS - I YEAR (II SEMESTER)**

**COURSE TITLE : Programming in C**

**COURSE CODE : BCAS-21**

**COURSE CREDIT : 4**

#### **COURSE OBJECTIVES**

While studying the Programming in C course, the student shall be able to:

CO1: Describe the fundamentals and basics of C

CO2: Create the control statements in C

CO3: Demonstrate the storage classes

CO4: Develop array structure and union

CO5: Recognize Pointers and files.

#### **BLOCK I: FUNDAMENTALS OF C**

C fundamentals Character set - Identifier and keywords - data types – constants - Variables - Declarations - Expressions – Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.

#### **BLOCK II: DATA INPUT, OUTPUT AND CONTROL STATEMENTS**

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

#### **BLOCK III: FUNCTIONS AND STORAGE CLASSES**

Functions -Definition - prototypes - Passing arguments - Recursions. - Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.

## **BLOCK IV: ARRAYS, STRUCTURES AND UNIONS**

Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String - Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

## **BLOCK V: POINTERS AND FILES**

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

### **Text Book**

1. E.Balagurusamy, “Programming in ANSI C”, Eighth Edition, Tata McGraw Hill, 2019.

### **Reference Books**

1. W.Kernighan and D M.Ritchie, “The C Programming Language”, 2<sup>nd</sup> Edition, PHI,.. 1988
2. H. Schildt, “C: The Complete Reference”, 4th Edition. TMH Edition, 2000.
3. Gottfried B.S, “Programming with C”, Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.
4. Kanetkar Y., “Let us C”, BPB Pub., New Delhi, 1999.

### **Web Links**

1. <https://youtu.be/05nhvJnTkeU>
2. <https://alvinser.com/fundamentals-of-c-programming.html>
3. <https://www.ibm.com/docs/en/itcam-app-mgr/7.2.0?topic=tesl-operators-expressions-1>
4. <https://www.programtopia.net/c-programming/docs/operators-expressions>
5. <https://byjus.com/gate/input-and-output-functions-in-c/>
6. <https://www.studytonight.com/c/c-input-output-function.php>

## **COURSE LEARNING OUTCOMES**

After completion of the Programming in C course, the student can be able to:

- CLO1: Memorize the fundamentals and basics of C
- CLO2: Write the control statements in C
- CLO3: Identify the storage classes
- CLO4: Indicate array structure and union
- CLO5: Separate Pointers and files.

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### **B. C. A. SYLLABUS - I YEAR (II SEMESTER)**

**COURSE TITLE : Open Source Technology**

**COURSE CODE : BCAS-22**

**COURSE CREDIT : 4**

#### **COURSE OBJECTIVES**

While studying the Open Source Technology course, the student shall be able to:

CO1: Describe about the open source software's.

CO2: Manipulate about the history, philosophy and license

CO3: Predict about community building, opening and starting the open source projects

CO4: Discover knowledge on the servers.

CO5: Observe about the ethical, social and financial impacts of open source software.

#### **BLOCK I: INTRODUCTION**

Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. - History: BSD, The Free Software Foundation and the GNU Project.

#### **BLOCK II: HISTORY, PHILOSOPHY AND LICENSE**

Open Source History, Initiatives, Principle and methodologies. - Philosophy: Software Freedom, Open Source Development Model - Licenses and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copy-lefts - Patents Economics of FOSS: Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization.

#### **BLOCK III: COMMUNITY BUILDING**

Community Building: Importance of Communities in Open Source Movement, JBoss Community - Starting and Maintaining an Open Source Project , Open Source Hardwar.

#### **BLOCK IV: SERVERS**

Apache HTTP Server and its flavors - WAMP server (Windows, Apache, MySQL, PHP)- Apache - MySQL, PHP, JAVA as development platform.

## **BLOCK V: ETHICS, SOCIAL AND FINANCIAL**

Open source vs. closed source Open source government, Open source ethics - Social and Financial impacts of open source technology - Shared software, Shared source.

### **TEXT BOOKS**

1. Sumitabha Das “Unix Concepts and Applications, Tata McGraw Hill Education 006
2. The Official Ubuntu Book, 8<sup>th</sup> Edition
3. Kailash Vadera, Bhavyesh Gandhi, “Open Source Technology”, University Science press.

### **REFERENCE BOOKS**

1. Paul Kavanagh, “Open Source Software: Implementation and Management”, Elsevier Digital Press
2. The Linux Documentation Project : <http://www.tldp.org>
3. Docker Project Home : <http://www.docker.com>.

### **Web Links**

1. [https://en.wikipedia.org/wiki/Free\\_Software\\_Foundation](https://en.wikipedia.org/wiki/Free_Software_Foundation)
2. [https://en.wikipedia.org/wiki/GNU\\_Free\\_Documentation\\_Lices](https://en.wikipedia.org/wiki/GNU_Free_Documentation_Lices)
3. [https://en.wikipedia.org/wiki/GNU\\_Project](https://en.wikipedia.org/wiki/GNU_Project)
4. [https://en.wikibooks.org/wiki/FOSS\\_Open\\_Standards/Standards\\_and\\_Internationalization/Localization\\_of\\_Software](https://en.wikibooks.org/wiki/FOSS_Open_Standards/Standards_and_Internationalization/Localization_of_Software)
5. <https://opensource.guide/starting-a-project/>
6. <https://www.oshwa.org/>
7. [https://en.wikipedia.org/wiki/Open-source\\_hardware](https://en.wikipedia.org/wiki/Open-source_hardware)

### **COURSE LEARNING OUTCOMES**

After completion of the Open Source Technology course, the student can be able to:

CLO1: Illustrate the open source methodologies

CLO2: Classify the history, philosophy and license

CLO3: Formulate about the community building, opening and starting the open source projects

CLO4: Summarize knowledge on the servers

CLO5: Discover the ethical, social and financial impacts of open source software

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**B. C. A. SYLLABUS - I YEAR (II SEMESTER)**

**COURSE TITLE** : **Digital Logic**  
**COURSE CODE** : **BCAS-23**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Digital logic course, the student shall be able to:

- CO1: Describe about the basic concepts of Digital Computer Fundamentals
- CO2: Modify about the concepts of logic gates, Boolean Algebra
- CO3: Classify the combinational circuits and Multiplexers
- CO4: Identify knowledge about the sequential logic and Registers
- CO5: Able to construct the different types of counters and enumerate about the memory.

**BLOCK I : INTRODUCTION TO NUMBER SYSTEM**

Number Systems and Codes: Number System, Base Conversion, Binary Codes. Code Conversion - Digital Logic: Logic Gates, Truth Tables, Universal Gates.

**BLOCK II : BOOLEAN ALGEBRA AND BINARY ARITHMETIC**

Boolean Algebra: Laws and Theorems, SOP, POS Methods - Simplification of Boolean Functions - Using Theorems, K-Map, Prime, Implicant Method - Binary Arithmetic: Binary Addition, Subtraction - Various Representations of Binary Numbers, Arithmetic Building Blocks, Adder, Subtractor.

**BLOCK III: COMBINATIONAL LOGIC**

Combinational Logic: Multiplexers, Demultiplexers - Decoders, Encoders, Code Converters - Parity Generators and Checkers.

## **BLOCK IV: SEQUENTIAL LOGIC AND REGISTERS**

Sequential Logic: RS, JK, D, and T Flip-Flops, Master-Slave Flip-Flops- Registers: Shift Registers, Types of Shift Registers.

## **BLOCK V: COUNTERS AND MEMORY**

Counters: Asynchronous and Synchronous Counters, Ripple, Mod, Up, Down Counters, Ring Counters - Memory: Basic Terms and Ideas, Types of ROMs, Types of RAMs - Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA).

### **Text Books :**

1. Digital Design – Third Edition , M.Morris Mano, Pearson Education/PHI.
2. Fundamentals Of Logic Design, Roth, 5th Edition, Thomson.

### **Reference Books**

1. V.Rajaraman and T.Radhakrishnan, *Digital Computer Design*, Prentice Hall of India, 2001
2. D.P.Leach and A.P.Malvino, *Digital Principles and Applications* – TMH – Fifth Edition – 2002.
3. M. Moris Mano, *Digital Logic and Computer Design*, PHI, 2001.
4. T.C.Bartee, *Digital Computer Fundamentals*, 6<sup>th</sup> Edition, Tata McGraw Hill, 1991.

### **Web Links**

1. [https://www.tutorialspoint.com/computer\\_logical\\_organization/binary\\_codes.htm](https://www.tutorialspoint.com/computer_logical_organization/binary_codes.htm)
2. <https://www.tutorialandexample.com/codes-in-digital-electronics/>
3. <http://www.ee.surrey.ac.uk/Projects/CAL/digital-logic/gatesfunc/index.html>
4. <http://www.uop.edu.pk/ocontents/Lec-10-universal%20gates.pdf>
5. <https://www.electronicshub.org/multiplexer-and-demultiplexer/>
6. <https://www.geeksforgeeks.org/encoders-and-decoders-in-digital-logic/>

## **COURSE LEARNING OUTCOMES**

After completion of the Digital logic course, the student can be able to:

CLO1: Memorize about the basic concepts of Number System.

CLO2: Demonstrate about the concepts of Binary Numbers and Boolean Algebra

CLO3: Construct the combinational circuits and Multiplexers

CLO4: Summarize knowledge about the sequential logic and Registers

CLO5: Collaborate the different types of counters and enumerate about the memory.

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**B. C. A. SYLLABUS - I YEAR (II SEMESTER)**

**COURSE TITLE : C Programming Lab**

**COURSE CODE : BCAS-P2**

**COURSE CREDIT : 2**

**COURSE OBJECTIVES**

While studying the C programming Lab course, the student shall be able to:

CO1: Make the student learn a programming language.

CO2: Discriminate problem solving techniques.

CO3: Explain programs in C and to solve the problems.

CO4: Demonstrate the string manipulation in C

CO5: Describe Sorting and Searching techniques.

**List of Programs**

**I Summation of Series**

1. Sin(x), 2. Cos(x), 3. Exp(x) (Comparison with built in functions)

**II String Manipulation**

1. Counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
2. Reverse a string and check for palindrome.
3. Sub string detection, count and removal.
4. Finding and replacing substrings

**III Recursion**

1.  ${}^n P_r$ ,  ${}^n C_r$
2. GCD of two numbers
3. Fibonacci sequence
4. Maximum & Minimum

## **IV Matrix Manipulation**

1. Addition and Subtraction
2. Multiplication
3. Transpose, and trace of a matrix
4. Determinant of a Matrix

## **V Sorting and Searching**

1. Insertion Sort
2. Bubble Sort
3. Linear Search
4. Binary Search

## **Web Links**

1. [https://www.youtube.com/playlist?list=PLdE8ESr9Th\\_t8RpyS4rlhNSjNNeVUAdwB](https://www.youtube.com/playlist?list=PLdE8ESr9Th_t8RpyS4rlhNSjNNeVUAdwB)
2. [https://www.youtube.com/watch?v=Az1XQ1hq\\_Ww](https://www.youtube.com/watch?v=Az1XQ1hq_Ww)
3. <https://archive.nptel.ac.in/courses/106/104/106104128/>

## **COURSE LEARNING OUTCOMES**

After completion of the C Programming Lab course, the student can be able to:

CLO1: Define, understand and trace the execution of programs written in C language.

CLO2: Locate the C code for a given algorithm.

CLO3: Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

CLO4: Demonstrate programs that perform operations using derived data types.

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**B. C. A. SYLLABUS - II YEAR (III SEMESTER)**

**COURSE TITLE** : **Programming Using C++**  
**COURSE CODE** : **BCAS-31**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Programming using C++ course, the student shall be able to:

- CO1: Paraphrase the basic concepts of the Object-Oriented Programming Paradigm.
- CO2: Examine the Functions in C++ and the different types of Constructors in C++.
- CO3: Indicate Operator Overloading.
- CO4: Identify the different types of Inheritance.
- CO5: Collaborate Stream Classes and Files.

**BLOCK I: BASIC CONCEPTS OF OOP**

Object-Oriented Programming (OOP) Paradigm – Basic Concepts of OOP – Benefits of OOP – Tokens – Keywords – Identifiers and Constants - Basic Data Types – User-Defined Data Types – Storage Classes – Derived Data Types – Symbolic Constants – Type Compatibility – Declaration of Variables – Dynamic Initialization of Variables – Reference Variables- Operators in C++ – Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator - Expressions and Their Types – Special Assignment Expressions – Implicit Conversions – Operator Overloading – Operator Precedence – Control Structures.

**BLOCK II: FUNCTIONS IN C++**

Functions in C++ – The Main Function – Function Prototyping – Call By Reference – Return by Reference – Inline Functions – Default Arguments – ‘const’ Arguments – Recursion – Function Overloading – Friend and Virtual functions – Math Library Functions - Classes and Objects – Specifying a Class – Defining Member Functions – Making an Outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays within a Class - Memory Allocation for Objects – Static Data Members – Static Member Functions – Array of Objects – Objects as

Function Arguments – Friendly Functions – Returning Objects – ‘const’ Member Functions – Pointers to Members – Local Classes.

### **BLOCK III: CONSTRUCTORS AND DESTRUCTORS**

Constructors – Parameterized Constructors – Multiple Constructors in a Class – Constructors with Default Arguments – Dynamic Initialization of Objects – Copy Constructors – Dynamic Constructors – Constructing Two-Dimensional Arrays – ‘const’ Objects – Destructors – Operator Overloading – Rules for Overloading Operators – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators Using Friends – Manipulation of Strings Using Operators – Type Conversions.

### **BLOCK IV: INHERITANCE**

Inheritance – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance - Virtual Base Classes – Abstract Classes – Constructors in Derived Class – Nesting of Classes – Pointers – Pointers to Objects – ‘this’ Pointer – Pointers to Derived Classes – Virtual Functions – Pure Virtual Functions – Virtual Constructors and Destructors.

### **BLOCK V: C++ STREAMS**

C++ Streams – C++ Stream Classes – Unformatted I/O Operations – Formatted Console I/O operations – Managing Output with Manipulators - Files – Classes for File Stream Operations – Opening and Closing a File – Detecting End-of-File – Open () File Modes – File Pointers and their Manipulators - Sequential Files – Random Access Files – Error Handling during File Operations – Command-Line Arguments.

#### **Text Book:**

1. E Balagurusamy, “Object Oriented Programming with C++”, Sixth Edition, McGraw Hill Education (India) Private Limited, 2013.

#### **References:**

1. Herbert Schildt, “C++: The Complete Reference”, Fifth Edition, McGraw-Hill Education, 2012.

#### **Web Links**

1. <https://www.ibm.com/docs/en/itcam-app-mgr/7.2.0?topic=tesl-operators-expressions-1>
2. <https://www.programtopia.net/cpp-programming/docs/operators-expressions>
3. [https://www.simplilearn.com/tutorials/cpp-tutorial/cpp-interview-questions?source=sl\\_frs\\_nav\\_playlist\\_video\\_clicked](https://www.simplilearn.com/tutorials/cpp-tutorial/cpp-interview-questions?source=sl_frs_nav_playlist_video_clicked)
4. <https://askaboutcpp.blogspot.com/2010/07/specifying-class.html>
5. <https://www.kindsonthegenius.com/cplusplus/c-string-manipulation/>

## **COURSE LEARNING OUTCOMES**

After completion of the Programming using C++ course, the student can be able to:

CLO1: Classify the basic concepts of the Object-Oriented Programming Paradigm.

CLO2: Experiment the Functions in C++ and the different types of Constructors in C++.

CLO3: Analyze Operator Overloading.

CLO4: Recognize the different types of Inheritance.

CLO5: Summarize Stream Classes and Files.

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**B. C. A. SYLLABUS - II YEAR (III SEMESTER)**

**COURSE TITLE** : **Allied Mathematics-II**  
**COURSE CODE** : **BMSSA-22**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Allied Mathematics – II, the Learner shall be able to:

- CO1: Define the basic Mathematical concepts like Beta, Gamma, Integrals
- CO2: State finite differences-forward and backward
- CO3: Discuss about Multiple Integrals.
- CO4: Evaluate Laplace Transform
- CO5: Classify merits and demerits of a rank correlation.

**BLOCK- I: Beta, Gamma Integrals**

- 1.1 Definitions of Beta and Gamma Integrals
- 1.2 Recurrence Formula for Gamma Functions
- 1.3 Properties of Beta Functions
- 1.4 Relation between Beta and Gamma Functions

**BLOCK -II: Numerical Differentiation and Integration**

- 2.1 Finite Differences- Forward and Backward
- 2.2 Derivatives using Newton's Forward Difference Formula
- 2.3 Derivatives using Newton's Backward Difference Formula
- 2.4 Numerical Integration using Trapezoidal Rule
- 2.5 Numerical Integration using Simpsons rule

**BLOCK -III: Multiple Integrals**

- 3.1 Definitions of Double and Triple Integrals
- 3.2 Change of Order of Integration for Two Variables
- 3.3 Double Integrals and Triple Integrals in Cartesian Coordinates

## **BLOCK- IV: Laplace Transform**

- 4.1 Definition and Transform of  $f'(t)$  &  $f''(t)$
- 4.2 Laplace Transform of Functions  $e^{-at}$ ,  $\cos at$ ,  $\sin at$ , and  $tn$  where 'n' is a Positive Integer
- 4.3 First Shifting Theorem - Laplace Transform of  $e^{-at} \cos bt$ ,  $e^{-at} \sin bt$  and  $e^{-at} tn$
- 4.4 Inverse Laplace Transform
- 4.5 Solving Second Order Differential Equations with Constant Coefficients using Laplace Transform

## **BLOCK -V: Statistics**

- 5.1 Correlation
- 5.2 Scatter diagram and its uses
- 5.3 Karl Pearson's Coefficient of Correlation
- 5.4 Correlation coefficient for a Bivariate Frequency Distribution
- 5.5 Probable error of correlation coefficient
- 5.6 Spearman's rank correlation coefficient
- 5.7 Merits and demerits of rank correlation coefficient

## **BOOKS FOR STUDY**

1. Narayanan S. and Manicavachagam Pillay T.K., Calculus-Vol II. Chennai: S.Viswanathan, 2012. Chapter 7      Sec. 2.1, 2.3, 3 - 5
2. Narayanan S., R. Hanumantha Rao,T.K. Manicavachgam Pillay, and P. Kandaswamy., Ancillary Mathematics – Volume – II. Madras.: Viswanathan, S, 1995 Reprint 2011.  
Chapter 3      Sec 1 - 3  
Chapter 7      Sec 1 – 6
3. R. S. N. Pillai and V. Bagavathi, Statistics, S. Chand & company Ltd, New Delhi, 2007. Chapter 12: Page No: 363 – 395.
4. Sastry S.S., Introductory Methods of Numerical Analyisi., Prentice – Hall of India Private Limited :New Delhi(2000).

Chapter 3      : Sections 3.3, 3.3.1, 3.3.2

Chapter 5      : Sections 5.1, 5.2(Numerical differentiation only), 5.4, 5.4.1, 5.4.2, 5.4.3

## **BOOKS FOR REFERENCE**

1. Gupta B.D., Numerical Analysis. Delhi:Konark Publishers pvt. Ltd. , 1999
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2007 Reprint 2014

3. Jeffrey Alan, Handbook of Mathematical formulas and Integrals, United States: Academic, 2004.
4. Narayanan S. & T.K. Manicavachagam Pillay, Calculus-Vol I, Madras: S. Viswanathan, 1997.
5. Vedamurthy, V.N., N. Ch. S. N. Iyengar. Numerical Methods. Delhi : Vikas Publishing House, 1998.

### **Web Links**

1. <https://www.youtube.com/watch?v=0rtaUUonwkU>
2. <https://www.youtube.com/watch?v=VMbJ1XyWWnU>
3. [https://www.youtube.com/watch?v=KqokoYr\\_h1A](https://www.youtube.com/watch?v=KqokoYr_h1A)

### **COURSE LEARNING OUTCOMES**

After completion of the Allied Mathematics – II, the Learner will be able to:

CLO1: Explain the basic Mathematical concepts like Beta, Gamma, Integrals

CLO2: Convert finite differences-forward and backward

CLO3: Discuss about Multiple Integrals.

CLO4: Correlate Laplace Transform

CLO5: Formulate merits and demerits of a rank correlation.

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**B. C. A. SYLLABUS - II YEAR (III SEMESTER)**

**COURSE TITLE** : **Data Structures**  
**COURSE CODE** : **BCAS-32**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Data Structures course, the student shall be able to:

- CO1: Demonstrate how to perform Matrix Operations using Two-Dimensional Arrays.
- CO2: Recognize Linked Lists and Linear Data Structures namely Stacks and Queues.
- CO3: Construct Non Linear Data Structures namely Binary Trees.
- CO4: Illustrate Search Operations using Linear Search, Binary Search and Hashing.
- CO5: Familiarize Sorting techniques namely Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort and Bucket Sort

**BLOCK I: INTRODUCTION TO DATA STRUCTURES**

Introduction to Data Structures – Linear and Non Linear Data Structures – Arrays – Types of Arrays – Representation of One-Dimensional Array in Memory - Array Traversal – Insertion and Deletion – Realizing Matrices using Two-Dimensional Arrays – Matrix Operations – Addition – Subtraction – Multiplication – Transpose - Linked Lists – Representation of Linked Lists – Advantages and Disadvantages of Linked List – Linked List Node Declaration – Linked List Operations – Linked List Implementation - Circular Linked List Operations – Circular Linked List Implementation – Doubly Linked List Node Declaration – Doubly Linked List Operations – Doubly Linked List Implementation.

**BLOCK II: STACKS AND QUEUES**

Stacks – Stack Representation in Memory – Arrays vs. Stacks – Stack Operations – Array Implementation of Stacks –Linked Implementation of Stacks - Queues – Logical Representation of Queues – Queue Operations – Array Implementation of Queues – Linked Implementation of Queues - Circular Queues – Priority Queues – Double-Ended Queues.

### **BLOCK III: TREES**

Trees – Tree Terminology – Binary Tree – Array representation of Binary Tree – Linked Representation of Binary Tree - Binary Tree Traversal – Binary Search Tree – Insert, Delete, and Search Operations on a Binary Tree and Binary Search Tree – Expression Trees.

### **BLOCK IV: GRAPHS**

Graphs – Graph Terminology – Implementing Graphs Using Adjacency Matrix, Path Matrix and Adjacency List - Shortest Path Algorithm – Breadth First Search and Depth First Search Traversal of a Graph - Searching – Linear Search – Binary Search – Hashing.

### **BLOCK V: SORTING**

Sorting – Selection Sort – Insertion Sort – Bubble Sort - Quick Sort – Merge Sort – Bucket Sort.

#### **Text Book:**

1. E Balagurusamy, “Data Structures”, McGraw Hill Education (India) Private Limited, 2019.

#### **References:**

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Pearson Education, 2007.
2. Reema Thareja, —Data Structures Using C++, Second Edition , Oxford University Press, 2011.
3. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C++, Second Edition, University Press, 2008.

#### **Web Links**

1. <https://www.youtube.com/watch?v=hk5rQs7TQ7E>
2. <https://tildesites.bowdoin.edu/~ltoma/teaching/cs210/fall10/Slides/StacksAndQueues.pdf>
3. <https://www.youtube.com/watch?v=LbcJw-iMIoI>

### **COURSE LEARNING OUTCOMES**

After completion of the Data Structures course, the student can be able to:

CLO1: Describe the Matrix Operations using Two-Dimensional Arrays.

CLO2: Illustrate Linked Lists and Linear Data Structures namely Stacks and Queues.

CLO3: Convert Non Linear Data Structures namely Binary Trees.

CLO4: Paraphrase Search Operations using Linear Search, Binary Search and Hashing.

CLO5: Point out Sorting techniques namely Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort and Bucket Sort.

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**B. C. A. SYLLABUS - II YEAR (DISTANCE MODE)**

**COURSE TITLE : C++ Laboratory**

**COURSE CODE : BCAS-P3**

**COURSE CREDIT : 2**

**COURSE OBJECTIVES**

While studying the C++ Laboratory course, the student shall be able to:

CO1: Explain about how to write basic C++ programming

CO2: Describe how to use control statements

CO3: Enumerate the usage of arrays and functions

CO4: Show how to create classes

**List of Programmes**

1. Write a C++ program to calculate average marks scored by a student for 3 subjects.
2. Write a C++ program to find the area and perimeter of a circle and rectangle.
3. Write a C++ program to swap two numbers.
4. Write a C++ program to find largest of three numbers.
5. Write a C++ program to find the maximum number among three numbers.
6. Write a C++ program to generate Fibonacci series.
7. Write a C++ program to perform string manipulation.
8. Find the length of a string. Compare two strings, Concatenate two strings, Reverse a string, Copy a string to another location.
9. Write a C++ program to find quotient and remainder of 2 numbers.
10. Write a C++ program to manipulate the class account using classes and function. A user should be able to perform the following functions.
  - a) Deposit money.
  - b) Withdraw money,
  - c) Calculate the interest

- d) Check the total balance in his account.
11. Write a C++ program to generate Prime numbers between 1 and 50.
  12. Write a C++ program to perform matrix addition and multiplication.
  13. Write a C++ program to check whether the given matrix is a sparse matrix or not.
  14. Write a C++ program to overload unary minus operator.
  15. Write a C++ program to calculate total sales and average sales made by a salesman.

#### Web Links

1. <https://www.youtube.com/watch?v=Ko-Q0Y5-b3k>
2. <https://www.youtube.com/watch?v=xLRMPeEezEk>
3. <https://www.youtube.com/watch?v=ViwqyfSIp5g>

### **COURSE LEARNING OUTCOMES**

After completion of the C++ Laboratory course, the student can be able to:

- CLO1: Explain how to write programs in C++
- CLO2: Experiment how to use control statements
- CLO3: Learn about arrays and functions
- CLO4: Demonstrate how to create classes

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**B. C. A. SYLLABUS - II YEAR (III SEMESTER)**

<b>COURSE TITLE</b>	<b>:</b>	<b>Data Structures Laboratory</b>
<b>COURSE CODE</b>	<b>:</b>	<b>BCAS-P4</b>
<b>COURSE CREDIT</b>	<b>:</b>	<b>2</b>

**COURSE OBJECTIVES**

While studying the Data Structures Laboratory course, the student shall be able to:

- CO1: Know about the working of linked list
- CO2: Understand the working of matrix manipulation
- CO3: Gather knowledge about how Stack Tree, and Queue is working
- CO4: Know about the working of quick sort algorithm

**List of Programs**

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
3. Implement add, delete operations of a queue using Arrays.
4. Implement add, delete operations of a queue using Pointers.
5. Conversion of infix to postfix using stack operations
6. Postfix Expression Evaluation.
7. Addition of two polynomials using Arrays and Pointers.
8. Creation, insertion, and deletion in doubly linked list.
9. Binary tree traversals (in-order, pre-order, and post-order) using linked list.
10. Depth First Search and Breadth first Search for Graphs using Recursion.

**Web Links**

1. <https://www.youtube.com/watch?v=o1QaGUEi6ew>
2. [https://www.youtube.com/watch?v=vpILz\\_sZvGU](https://www.youtube.com/watch?v=vpILz_sZvGU)
3. [https://www.youtube.com/watch?v=g1sNOOZC\\_u0](https://www.youtube.com/watch?v=g1sNOOZC_u0)

## **COURSE LEARNING OUTCOMES**

After completion of the Data Structures Laboratory course, the student can be able to:

CLO1: Acquire knowledge about the working of linked list

CLO2: Understand the working of matrix manipulation

CLO3: Learn how to program Stack Tree, and Queue

CLO4: Know the working of quick sort algorithm

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### B. C. A. SYLLABUS - II YEAR (III SEMESTER)

**COURSE TITLE : ENVIRONMENTAL STUDIES**

**COURSE CODE : CCE**

**COURSE CREDIT : 2**

#### **Unit 1:**

The Multi-disciplinary nature of environmental studies - Definition, scope and importance - Need for public awareness.

#### **Unit 2:**

Natural Resources - Renewable and non-renewable resources - Natural resources and associated problems.

- a. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b. Water resources: Use and over – utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems.
- c. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity case studies.
- e. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- f. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- g. Role of an individual in conservation of natural resources - Equitable use of resources for sustainable lifestyles.

#### **Unit 3 : Ecosystems:**

Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological Succession - Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem:-

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### **Unit 4: Biodiversity and its conservation:**

Biodiversity and its conservation - Introduction – Definition : genetic, species and ecosystem diversity - Biogeographical classification of India - Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as a mega – diversity nation - Hot-spots of biodiversity - Threats to biodiversity : habitat loss, poaching of wildlife, man wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity : *In-situ* and *Ex-situ* conservation of biodiversity.

#### **Unit 5: Environmental Pollution:**

Environmental Pollution - Definition - Causes, effects and control measures of : Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards - Solid waste Management - Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides.

#### **Unit 6: Social Issues and the Environment:**

Social issues and the Environment - From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; it's problems and concerns. Case studies - Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies - Wasteland reclamation - Consumerism and waste products - Environment Protection Act - Air (Prevention and Control of Pollution) Act - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act - Issues involved in enforcement of environmental legislation - Public awareness.

#### **Unit 7: Human Population and the Environment:**

Human Population and the Environment - Population growth, variation among nations - Population explosion - Family Welfare Programme - Environment and human health - Human Rights - Value Education - HIV / AIDS - Women and Child Welfare - Role of Information Technology in Environment and human health - Case Studies.

#### **Unit: 8 Field Work Visit:**

Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

#### **Suggested Readings:**

1. Carson, R.2002.Silent Spring, Houghton Mifflin Harcourt.
2. Gadgil, M.,&Guha,R. 1993. This Fissured Land: An Ecological History of India, Univ. Of California Press.
3. Glesson, B. And Law, N.(eds.)1999, Global Ethics and Environment, London, Routledge.

4. Glied, P.H. 1993. Water Crisis, Pacific Institute for Studies in Dev. Environment & Security, Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll, Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M. K. 2013. Threats from India's Himalayas dams. Science, 339:36-37
7. McCully, P. 1996. Rivers no more : the environmental effects of dams (pp.29.64). Zed books.
8. McNeill John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrees, J. 1971. Fundamentals of Ecology, Philadelphia Saunders.
10. Pepper, J.J., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment, Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S. & Noble, M.L. 2001. Environmental law and policy in India, Tirupathi 1992.
14. Sengupta, R. 2003. Ecology and Economics: An approach to sustainable development. OUP
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology Environmental Science and Conservation, S. Chand Publishing. New Delhi.
16. Sodhi, N.S., Gibson, I., & Raven, P.H. (Eds). 2013. Conservation Biology : Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Waren, C.E. 1971. Biology and water Pollution Control. WB Saunders.
19. Wilson, E.O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.

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**B. C. A. SYLLABUS - II YEAR (IV SEMESTER)**

**COURSE TITLE** : **Operating Systems**  
**COURSE CODE** : **BCAS-41**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Operating Systems course, the student shall be able to:

- CO1: Describe the Fundamentals for Operating Systems
- CO2: Acquire Knowledge on Process Management
- CO3: Discuss the CPU Scheduling Algorithms.
- CO4: Point out the functions of Memory Management
- CO5: Summarize the File Management Systems.

**BLOCK I: FUNDAMENTALS OF OPERATING SYSTEM**

Introduction– Types of Operating System –Operating-System Operations–Resource Management –Security and Protection –Virtualization –Distributed Systems - Operating-System Services – User and Operating-System Interface –System Calls –System Services - Linkers and Loaders–Operating-System Structure –Building and Booting an Operating System.

**BLOCK II: PROCESS MANAGEMENT**

Process Management –Process Concept –Process Scheduling –Operations on Processes - Interprocess Communication –IPC in Shared-Memory Systems –IPC in Message-Passing Systems–Examples of IPC Systems –Communication in Client–Server Systems - Threads and Concurrency–Multicore Programming –Multithreading Models –Thread Libraries –Implicit Threading –Threading Issues.

**BLOCK III: CPU SCHEDULING**

CPU Scheduling–Basic Concepts –Scheduling Criteria –Scheduling Algorithms –Thread Scheduling –Multi-Processor Scheduling – Real-Time CPU Scheduling - Process Synchronization –The Critical-Section Problem –Peterson’s Solution –Hardware Support for Synchronization – Mutex Locks –Semaphores–Monitors–Deadlocks–System Model.- Deadlock

in Multithreaded Applications –Deadlock Characterization –Methods for Handling Deadlocks – Deadlock Prevention–Deadlock Avoidance –Deadlock Detection –Recovery from Deadlock.

#### **BLOCK IV: MEMORY MANAGEMENT**

Memory Management – Contiguous Memory Allocation –Paging –Structure of the Page Table – Swapping –Virtual Memory–Demand Paging –Copy-on-Write – Page Replacement –Allocation of Frames –Thrashing –Memory Compression–Allocating Kernel Memory.

#### **BLOCK V: FILE MANAGEMENT**

File-System Implementation–File-System Structure –File-System Operations –Directory Implementation - Allocation Methods –Free-Space Management –Efficiency and Performance– Recovery – The WAFL File System–File-System Internals–File-System Mounting –Partitions and Mounting–File Sharing –Virtual File Systems –Remote File Systems–Consistency Semantics –Network File Systems.

#### **Text Book:**

1. Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne “Operating System Concepts”, Tenth Edition, Wiley, 2018.

#### **References:**

1. Andrew S. Tanenbaum, and Herbert Bos, “Modern Operating Systems”, Fourth Edition, Pearson Education Limited, 2015.

#### **Web Links**

1. <https://www.youtube.com/watch?v=mXw9ruZaxzQ>
2. <https://www.youtube.com/watch?v=rFt1hwh-8zU>
3. <https://www.youtube.com/watch?v=392uyAUJqO4>
4. <https://www.youtube.com/watch?v=FpuIQrxBLsw>

#### **COURSE LEARNING OUTCOMES**

After completion of the Operating Systems course, the student can be able to:

CLO1: Explain the Fundamentals for Operating Systems

CLO2: Identify the Knowledge on Process Management

CLO3: Define the CPU Scheduling Algorithms.

CLO4: State the functions of Memory Management

CLO5: Paraphrase the File Management Systems.

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**B. C. A. SYLLABUS - II YEAR (IV SEMESTER)**

**COURSE TITLE** : **Data Base Management System**  
**COURSE CODE** : **BCAS-42**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Data Base Management System course, the student shall be able to:

- CO1: Learn the basics of Database Management Systems.
- CO2: Describe the conceptual data model and Entity Relationship (ER) Model.
- CO3: Design the Relational Data Model and Relational Algebra.
- CO4: Categorize the normalization in Relational Database Design.
- CO5: Demonstrate the NOSQL Databases and Big Data.

**BLOCK I: INTRODUCTION TO DATABASES**

Introduction – Example – Characteristics of the Database Approach – Actors on the Scene – Workers behind the Scene – Advantages of Using the DBMS Approach - Database Applications – When Not to Use a DBMS – Data Models – Schemas – Instances – Three Schema Architecture - Data Independence – Database Languages and Interfaces – Database System Environment – Architectures for DBMSs – Classification of DBMSs.

**BLOCK II: CONCEPTUAL DATA MODELING AND DATABASE DESIGN**

Entity Relationship Model – Entity Types – Entity Sets – Attributes – Keys – Relationship Types – Relationship Sets – Roles - Structural Constraints – Strong Entity Types – Weak Entity Types – Enhanced Entity Relationship Model - Specialization and Generalization – Constraints and Characterization of Specialization and Generalization Hierarchies.

**BLOCK III: RELATIONAL DATA MODEL, RELATIONAL ALGEBRA AND SQL**

Relational Model Concepts – Super Key – Candidate Key – Primary Key – Alternate Key – Foreign Key - Relation Model Constraints and Relational Database Schemas – Update Operations – Transactions and Dealing with Constraint Violations - Unary and Binary Relational Operations in Relational Algebra – Queries in Relational Algebra – Basic SQL – SQL Data

Definition and Data Types – Specifying Constraints in SQL - Basic Retrieval Queries in SQL – Insert, Delete and Update Statements in SQL – Views in SQL.

#### **BLOCK IV: RELATIONAL DATABASE DESIGN**

Mapping Entity Relationship Model to Relations – Mapping Enhance Entity Relationship Model to Relations - Database Normalization – Functional Dependencies – First Normal Form – Second Normal Form and Third Normal Form.

#### **BLOCK V: NOSQL DATABASES AND BIG DATA**

Introduction – CAP Theorem – Document Based NOSQL Systems and MongoDB – NOSQL Key Value Stores – Column Based NOSQL Systems – NOSQL Graph Databases – Neo4j - Big Data – Characteristics of Big Data – Introduction to MapReduce and Hadoop – Hadoop Distributed File System.

#### **Text Book:**

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson Education, 2017.

#### **References:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2014.
2. C. J. Date, A. Kannan, S. Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

#### **Web Links**

1. [https://www.w3schools.com/sql/sql\\_intro.asp](https://www.w3schools.com/sql/sql_intro.asp)
2. <https://www.geeksforgeeks.org/difference-between-dbms-and-sql/>
3. [https://www.tutorialspoint.com/dbms/sql\\_overview.htm](https://www.tutorialspoint.com/dbms/sql_overview.htm)
4. <https://www.guru99.com/database-normalization.html>
5. <https://www.ibm.com/in-en/cloud/learn/cap-theorem>

#### **COURSE LEARNING OUTCOMES**

After completion of the Database Management Systems course, the student can be able to:

- CLO1: Teach the basics of Database Management Systems.
- CLO2: Relate the conceptual data model and Entity Relationship (ER) Model.
- CLO3: Differentiate the Relational Data Model and Relational Algebra.
- CLO4: Classify the normalization in Relational Database Design.
- CLO5: Compare the NOSQL Databases and Big Data.

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**B. C. A. SYLLABUS - II YEAR (IV SEMESTER)**

**COURSE TITLE** : **WEB Designing**  
**COURSE CODE** : **BCAS-43**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Web Designing course, the student shall be able to:

- CO1: Describe about APPLETT
- CO2: Teach about Networking and RMI
- CO3: Recognize the concepts Swing and AWT
- CO4: Explain about the database connectivity and Servlet
- CO5: Correlate the Java Beans concepts.

**BLOCK - I: INTRODUCTION TO APPLETT**

Introduction to applet –lifecycle of applet- servlet and its life cycle – HTML fundamentals - JSP fundamentals-variables-control structures, Applet to servlet communications. Servlets – deployment of simple servlets - web server (Java web server/Tomcat sever/Web logic)- HTTP GET and POST request-Session tracking-cookies - JDBC-Simple Web application-multi tier applications.

**BLOCK - II: NETWORKING AND RMI**

Connecting to a Server - Implementing Servers - Advanced Socket Programming: InetAddress - URL Connections. Remote Method Invocations: Setting Up Remote Method Invocation - Parameter Passing in Remote Methods.

**BLOCK - III: ADVANCED SWING AND AWT**

Lists – Trees – Tables - Styled Text Components - Component Organizers – Shapes - Images.

**BLOCK - IV: DATABASE CONNECTIVITY AND SERVLET**

The Design of JDBC - Basic Concepts - Executing Queries - Result Sets – Metadata - Transactions, Servlets.

## **BLOCK -V: JAVABEANS**

The Bean-Writing Process - Using Beans to Build an Application - Bean Property Types - Customizers.

### **Reference books:**

1. Cay S. Horstmann, Gary Cornell, *Core Java™ 2: Volume II–Advanced Features*, Prentice Hall, 2008.
2. Patrick Naughton & Herbert Schildt, *The Complete Reference: Java 2*, Tata McGraw Hill, 8 th Edition 2011.
3. Experiment the need for Database Management Systems
4. Solve conceptual models for any real world application
5. Describe Design databases for any real world application Understand the need for Database Normalization
6. Extend Understanding on NOSQL Databases and Big Data

### **Web Links**

1. [https://www.utc.fr/~dnace/dokuwiki/\\_media/fr/servletesjsp\\_translated.pdf](https://www.utc.fr/~dnace/dokuwiki/_media/fr/servletesjsp_translated.pdf)
2. [https://www.w3schools.com/html/html\\_basic.asp](https://www.w3schools.com/html/html_basic.asp)
3. <https://www.studytonight.com/servlet/storing-session-using-cookies.php>
4. <https://beginnersbook.com/2013/05/servlet-cookies/>
5. [https://www.w3schools.com/tags/ref\\_httpmethods.asp](https://www.w3schools.com/tags/ref_httpmethods.asp)
6. <https://slideplayer.com/slide/5228556/>

### **COURSE LEARNING OUTCOMES**

CLO1: Identify about APPLET

CLO2: Learn about Networking and RMI

CLO3: Demonstrate the concepts Swing and AWT

CLO4: Modify about the database connectivity and Servlet

CLO5: Estimate the Java Beans concepts.

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**B. C. A. SYLLABUS - II YEAR (IV SEMESTER)**

**COURSE TITLE** : **Software Engineering**  
**COURSE CODE** : **BCAS-44**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Software Engineering course, the student shall be able to:

- CO1: Examine the nature of software.
- CO2: Memorize Prescriptive Process Models.
- CO3: Defines the Modeling Principles.
- CO4: Select the Software Design aspects
- CO5: Indicate on Software Testing Strategies and Software Configuration Management.

**BLOCK I: THE NATURE OF SOFTWARE**

The Nature of Software – Defining Software – Software Application Domains – Legacy Software – The Changing Nature of Software – Web Apps – Mobile Applications – Cloud Computing – Product Line Software – Defining the Discipline – The Software Process – The Process Framework – Umbrella Activities – Process Adaptation – Software Engineering Practice – The Essence of Practice – General Principles – Software Development Myths – Software Process Structure – A Generic Process Model – Defining a Framework Activity – Identifying a Task Set – Process Patterns – Process Assessment and Improvement.

**BLOCK II: PRESCRIPTIVE PROCESS MODELS**

Prescriptive Process Models – The Waterfall Model – Incremental Process Models – Evolutionary Process Models – Concurrent Models – A Final Word on Evolutionary Processes – Specialized Process Models – Component-Based Development – The Formal Methods Model – Aspect-Oriented Software Development – The Unified Process – Phases of the Unified Process – Personal and Team Process Models – Personal Software Process – Team Software Process – Process Technology – Product and Process – Agility – Agility and the Cost of Change – Agile Process – Agility Principles – The Politics of Agile Development – Extreme Programming – The

XP Process – Industrial XP – Other Agile Process Models – Scrum – Dynamic Systems Development Method – Agile Modeling – Agile Unified Process.

### **BLOCK III: MODELING**

Modeling – Principles That Guide Process, Practice and Each Framework Activity – Communication, Planning, Modeling, Construction and Deployment Principles – Requirements Engineering – Establishing the Groundwork – Identifying Stakeholders – Recognizing Multiple Viewpoints – Working toward Collaboration – Asking the First Questions – Nonfunctional Requirements – Traceability – Eliciting Requirements – Collaborative Requirements Gathering – Quality Function Deployment – Usage Scenarios – Elicitation Work Products – Agile Requirements Elicitation – Service-Oriented Methods – Developing Use Cases – Building the Analysis Model – Elements of the Analysis Model – Analysis Patterns – Agile Requirements Engineering – Requirements for Self-Adaptive Systems – Negotiating Requirements – Requirements Monitoring – Validating Requirements – Avoiding Common Mistakes – Requirements Analysis – Overall Objectives and Philosophy – Analysis Rules of Thumb – Domain Analysis – Requirements Modeling Approaches – Scenario-Based Modeling – Creating a Preliminary Use Case – Refining a Preliminary Use Case – Writing a Formal Use Case – UML Models That Supplement the Use Case – Developing an Activity Diagram – Swimlane Diagrams – Requirements Modeling: Class-Based Methods – Identifying Analysis Classes – Specifying Attributes – Defining Operations – Class-Responsibility-Collaborator Modeling – Associations and Dependencies – Analysis Packages.

### **BLOCK IV: SOFTWARE DESIGN**

Software Design – Design within the Context of Software Engineering – The Design Process – Software Quality Guidelines and Attributes – The Evolution of Software Design – Design Concepts – Abstraction – Architecture – Patterns – Separation of Concerns – Modularity – Information Hiding – Functional Independence – Refinement – Aspects – Refactoring – Object-Oriented Design Concepts – Design Classes – Dependency Inversion – Design for Test – Design Model – Data Design Elements – Architectural Design Elements – Interface Design Elements – Component-Level Design Elements – Deployment-Level Design Elements – Designing Class-Based Components – Basic Design Principles – Component-Level Design Guidelines – Cohesion – Coupling.

## **BLOCK V: SOFTWARE TESTING STRATEGIES**

Software Testing Strategies – A Strategic Approach to Software Testing – Verification and Validation – Organizing for Software Testing – Software Testing Strategy – Criteria for Completion of Testing – Strategic Issues – Test Strategies for Conventional Software – Unit Testing – Integration Testing – Test Strategies for Object-Oriented Software – Unit Testing in the OO Context – Integration Testing in the OO Context – Test Strategies for WebApps – Test Strategies for MobileApps – Validation Testing – Validation-Test Criteria – Configuration Review – Alpha and Beta Testing – System Testing – Recovery Testing – Security Testing – Stress Testing – Performance Testing – Deployment Testing – The Art of Debugging – The Debugging Process – Psychological Considerations – Debugging Strategies – Correcting the Error – White-Box Testing – Basis Path Testing – Flow Graph Notation – Independent Program Paths – Deriving Test Cases – Graph Matrices – Control Structure Testing – Black-Box Testing – Graph-Based Testing Methods – Equivalence Partitioning – Boundary Value Analysis – Orthogonal Array Testing – Model-Based Testing – Software Configuration Management – Elements of a Configuration Management System – Baselines – Software Configuration Items – Management of Dependencies and Changes.

### **Text Book:**

1. Roger S. Pressman and Bruce R. Maxim, “Software Engineering”, A Practitioner’s Approach, Eighth Edition, McGraw-Hill Education, 2015.

### **References:**

2. Ian Sommerville, “Software Engineering”, Tenth Edition, Pearson 2016.
3. Ian Sommerville, “Engineering Software Products”, Pearson 2019.

### **Web Links**

1. <https://clearbridgemobile.com/cloud-apps-vs-web-apps/>
2. <https://searchcloudcomputing.techtarget.com/definition/cloud-application>
3. <http://users.csc.calpoly.edu/~jdalbey/308/Lectures/SoftwareProcessModels.html>
4. [http://www.se.rit.edu/~se361/Slides/se361\\_Chapter\\_03.pdf](http://www.se.rit.edu/~se361/Slides/se361_Chapter_03.pdf)
5. <https://www.tutorialride.com/software-engineering/agile-process-in-software-engineering.htm>
6. <https://smartbear.com/learn/automated-testing/software-testing-methodologies/>
7. [https://www.tutorialspoint.com/software\\_engineering/software\\_testing\\_overview.htm](https://www.tutorialspoint.com/software_engineering/software_testing_overview.htm)

## **COURSE LEARNING OUTCOMES**

After completion of the Software Engineering course, the student can be able to:

CLO1: Identify the nature of software.

CLO2: Memorize Prescriptive Process Models.

CLO3: Enumerate the Modeling Principles.

CLO4: Select the Software Design aspects

CLO5: Indicate on Software Testing Strategies and Software Configuration Management.

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**B. C. A. SYLLABUS - II YEAR (IV SEMESTER)**

**COURSE TITLE** : **Web Designing Laboratory (HTML/DHTML/CSS)**  
**COURSE CODE** : **BCAS- P5**  
**COURSE CREDIT** : **2**

**COURSE OBJECTIVES**

While studying the Web Technology Lab course, the student shall be able to:

CO1: Teach about the how to design web pages using various HTML tags

CO2: Show about the concepts of JavaScript

CO3: Create forms using JavaScript

**List of Experiments**

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
3. Create a page with dynamic effects. Write the code to include layers and basic animation.
4. Write a JavaScript code to find the sum of N natural Numbers.
5. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
6. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
7. Create a Web services with RMI.
8. Implement RMI program to perform arithmetic functions.
9. Develop a simple application to insert and retrieve data from database.
10. Design a colour bean.

**Web Links**

1. <https://www.youtube.com/watch?v=TA5UKNGQGw>
2. <https://www.youtube.com/watch?v=itx0RYOnoBs>
3. [https://www.youtube.com/watch?v=\\_zMpAWY0c6E](https://www.youtube.com/watch?v=_zMpAWY0c6E)

**COURSE LEARNING OUTCOMES**

After completion of the Web Technology Lab course, the student can be able to:

CLO1: Design web pages using various HTML tags

CLO2: Develop JavaScript to implement arrays.

CLO3: Write JavaScript to create forms.

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### B. C. A. SYLLABUS - II YEAR (IV SEMESTER)

**COURSE TITLE** : **Data Base Management System Laboratory**  
**COURSE CODE** : **BCAS-P6**  
**COURSE CREDIT** : **2**

#### **COURSE OBJECTIVES**

While studying the Data Base Management System Lab course, the student shall be able to:

- CO1: Observe about the basic concepts of SQL Commands
- CO2: Prepare the concepts of nested and join queries
- CO3: Develop the concepts of functions, procedures and procedural extensions of databases.
- CO4: Design and implementation of typical database applications.
- CO5: Construct the concepts of a front end tool for GUI based application development

#### **List of Experiments**

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables and explore sub queries and simple join operations.
4. Query the database tables and explore natural, equi and outer joins.
5. Write user defined functions and stored procedures in SQL.
6. Execute complex transactions and realize DCL and TCL commands.
7. Write SQL Triggers for insert, delete, and update operations in database table.
8. Create View and index for database tables with large number of records.
9. Create a XML database and validate it using XML schema.
10. Create Document, column and graph based data using NOSQL database tools.

#### **Web Links**

1. <https://www.youtube.com/watch?v=P7-wKbKrAhk>
2. <https://www.youtube.com/watch?v=i6JGg1jFzyM>
3. <https://www.youtube.com/watch?v=IBK0LifIHFA>

#### **COURSE LEARNING OUTCOMES**

After completion of the Data Base Management System Lab course, the student can be able to:

- CLO1: Develop the basic concepts of SQL Commands
- CLO2: Organize the concepts of nested and join queries
- CLO3: Write the concepts of functions, procedures and procedural extensions of databases.
- CLO4: Design and implementation of typical database applications.
- CLO5: Create the concepts of a front end tool for GUI based application development.

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**B. C. A. SYLLABUS - III YEAR (V SEMESTER)**

**COURSE TITLE** : **Data Communication & Networking**  
**COURSE CODE** : **BCAS-51**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Data Communication and Networking course, the student shall be able to:

- CO1: Describes the basics of network
- CO2: Enumerate Wireless Transmission with design issues.
- CO3: Summarize the concept of Data Link Layer and its protocols.
- CO4: Paraphrase routing algorithm and IP Protocols.
- CO5: Explain the concept of transport layer services and network security.

**BLOCK I: INTRODUCTION TO NETWORKS**

Introduction to Network Hardware and Software - Reference Models – OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer - Theoretical Basis for Data Communication - Guided Transmission Media.

**BLOCK II: WIRELESS TRANSMISSION**

Wireless Transmission - Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching - Data Link Layer: Design Issues – Error Detection and Correction.

**BLOCK III: DATA LINK LAYER**

Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem – Multiple Access Protocols – Bluetooth.

**BLOCK IV: NETWORK LAYER**

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol – IP Addresses – Internet Control Protocols.

## **BLOCK V: TRANSPORT LAYER**

Transport Layer – Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol – Internet Transport Protocols (ITP) -Network Security: Cryptography.

### **TEXT BOOK**

1. A. S. Tanenbaum, “Computer Networks”, 4<sup>th</sup> Edition, Prentice-Hall of India, 2008.

### **REFERENCE BOOKS**

1. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2007.
2. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008.
3. D. Bertsekas and R. Gallager, “Data Networks”, 2<sup>nd</sup> Edition, PHI, 2008.
4. Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002.

### **Web Links**

1. <https://www.youtube.com/watch?v=mYWslbszYQ>
2. <https://www.youtube.com/watch?v=yiLL32bX77s>
3. <https://www.youtube.com/watch?v=kAty4mKczEg>
4. <https://www.youtube.com/watch?v=nfpBQCOXr9Y>

### **COURSE LEARNING OUTCOMES**

After completion of the Data Communication and Networking course, the student can be able to:

CLO1: Summarize the basics of network.

CLO2: Identify the Wireless Transmission and its design issues.

CLO3: Learn the concept of Data Link Layer and its protocols.

CLO4: Develop the routing algorithm and IP Protocols.

CLO5: Describe the concept of transport layer services and network security.

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**B. C. A. SYLLABUS - III YEAR (V SEMESTER)**

**COURSE TITLE** : **Programming in Java**  
**COURSE CODE** : **BCAS-52**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Programming in Java course, the student shall be able to:

- CO1: Describe the Object Oriented features supported by Java.
- CO2: Demonstrate the looping and classes.
- CO3: Exploring the various arrays available in Java.
- CO4: Discriminate knowledge on creating, accessing and using a Package.
- CO5: Construct the Exception Handling in Java.

**BLOCK I: JAVA FEATURES**

Java Features – Comparison of C++ and Java – Java Virtual Machine – Constants – Variables – Data Types – Scope of Variables – Type Casting – Java Program Structure - Operators and Expressions – Arithmetic – Logical – Relational – Assignment – Increment and Decrement – Conditional – Bitwise – Special Operators - Arithmetic Expressions – Evaluation of Expressions – Type Conversion in Expressions – Operator Precedence and Associativity – Mathematical Functions.

**BLOCK II: LOOPING, CLASSES AND OBJECTS**

Decision Making, Branching and Looping – If Statement – If ... Else Statement – Nesting of If ... Else Statements – Else If Ladder – Switch Statement – The ?: Operator - While Statement – Do Statement – For Statement – Jumps in Loops – Return Statement – Labeled Loops - Classes, Objects and Methods – Defining a Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing Class Members - Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Abstract Methods and Classes.

### **BLOCK III: ARRAYS**

Arrays, Strings and Vectors – One Dimensional Arrays – Creating an Array – Two Dimensional Arrays - Strings – Vectors – Wrapper Classes – Enumerated Types – Annotations - Interfaces – Defining Interfaces – Implementing Interfaces – Accessing Interface Variables.

### **BLOCK IV: PACKAGES**

Packages – Java API Packages – Using System Packages – Naming Conventions - Creating Packages – Accessing a Package – Using a Packages – Adding a Class to a Package – Hiding Classes – Static Import.

### **BLOCK V: EXCEPTIONS**

Managing Errors and Exceptions – Types of Exceptions – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements - Using Finally Statement – Throwing Our Own Exception – Using Exceptions for Debugging.

#### **Text Book:**

1. E Balagurusamy, “Programming with Java”, Sixth Edition, McGraw Hill Education (India) Private Limited, 2019.

#### **References:**

1. Herbert Schildt, “Java: The Complete Reference”, Ninth Edition, McGraw Hill Professional, 2014.

#### **Web Links**

1. <https://www.javatpoint.com/features-of-java>
2. <https://www.youtube.com/watch?v=L677QCBCuWk>
3. <https://www.youtube.com/watch?v=hAk7abWHi3w>
4. [https://www.youtube.com/watch?v=\\_nmm0nZqIYY](https://www.youtube.com/watch?v=_nmm0nZqIYY)

### **COURSE LEARNING OUTCOMES**

After completion of the Programming in Java course, the student can be able to:

- CLO1: Explain the Object Oriented features supported by Java.
- CLO2: Illustrate the looping and classes.
- CLO3: Formulate the various arrays available in Java.
- CLO4: Discriminate knowledge on creating, accessing and using a Package.
- CLO5: Assess the Exception Handling in Java.

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**B. C. A. SYLLABUS - III YEAR (V SEMESTER)**

**COURSE TITLE** : **Programming in Python**  
**COURSE CODE** : **BCAS-53**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Programming in Python course, the student shall be able to:

- CO1: Explain the basic concepts of Python language.
- CO2: Develop the functions and exception handling in Python
- CO3: Demonstrate the file handling and MySQL Database.
- CO4: Develop the concepts of graphics programming and Scientific Programming using NumPy / SciPy
- CO5: Create testing and version control systems.

**BLOCK I: INTRODUCTION**

Introduction to Python - Why Python - Installing in various Operating Systems - Executing Python Programs - Basic Programming concepts - Variables, expressions and statements - Input/Output – Operators.

**BLOCK II: DATA FLOW**

Conditions - Functions - Arguments - Return values - Iteration - Loops - Strings - Data Structures - Lists - Dictionaries - Tuples - Sequences - Exception Handling.

**BLOCK III: FILE HANDLING AND DATABASE**

File Handling - Modules - Regular Expressions - Text handling - Object Oriented Programming - Classes - Objects - Inheritance - Overloading Polymorphism - Interacting with Databases - Introduction to MySQL - interacting with MySQL - Building a address book with add/edit/delete/search features.

## **BLOCK IV: GRAPHICS PROGRAMMING**

Introduction to Graphics programming - Introduction to GTK - PyGTK - Developing GUI applications using PyGTK - Scientific Programming using NumPy / SciPy - Image Processing - Processing multimedia files -Network Programming - Web services using SOAP, Introduction to Graphics programming - PyGame

## **BLOCK V: TESTING AND VERSION CONTROL SYSTEMS**

Introduction to Version Control Systems – Subversion/Git - Writing Unit Tests- Creating Documentation - Contributing to Open Source Projects

### **Text Book**

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 1<sup>st</sup> Edition 2012, O'Reilly.

### **Reference Books**

1. Jeff McNeil, "Python 2.6 Text Processing: Beginners Guide", 2010 ,Packet Publications
2. Mark Pilgrim, "Dive Into Python " , 2<sup>nd</sup> edition 2009, Apress.

### **Web Links**

1. <https://www.youtube.com/watch?v=aequTxAvQq4>
2. <https://www.youtube.com/watch?v=3QpZ1Y4v824>
3. <https://www.youtube.com/watch?v=zEb9zn1RvpM>
4. [https://www.youtube.com/watch?v=R39vTAj1u\\_8](https://www.youtube.com/watch?v=R39vTAj1u_8)
5. <https://www.youtube.com/watch?v=HKTyOUx9Wf4>

## **COURSE LEARNING OUTCOMES**

After completion of the Programming in Python course, the student can be able to:

CLO1: Assess the basic concepts of Python language.

CLO2: Demonstrate the functions and exception handling in Python.

CLO3: Develop the file handling system in Python and MySQL Database.

CLO4: Explain the concepts of graphics programming and Scientific Programming using NumPy / SciPy.

CLO5: Create testing and version control systems.

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**B. C. A. SYLLABUS - III YEAR (V SEMESTER)**

**COURSE TITLE** : **Programming in Java - Laboratory**  
**COURSE CODE** : **BCAS-P7**  
**COURSE CREDIT** : **4**

**COURSE OBJECTIVES**

While studying the Programming in Java Laboratory course, the student shall be able to:

- CO1: Describe the knowledge on Java Compiler and work with eclipse platform
- CO2: Learn how to use the control statements in Java
- CO3: Experiment the concepts of multi-threading and exception handling
- CO4: Explain the concepts of graphics programming.

**List of Experiments**

1. Write a Java program for student Mark-List preparation.
2. Write a Java program to reverse and finding sum of individual digits of a given number
3. Develop an applet in Java that displays a simple message.
4. Develop an applet in Java that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named “Compute” is clicked.
5. Write a Java program for finding volume of a sphere (Concept: Class and Object)
6. Write a Java program for preparing Employee salary Report (Concept : Array of Objects)
7. Write a Java program for checking whether a given number is palindrome or not (Concept : Abstract Class).
8. Write a Java Program for Electricity charge calculation (Concept : Implementing Multiple Inheritance).
9. Write a Java program to find area of Triangle and Rectangle (Concept : Package , Interface).
10. Write a Java program for queue implementation (Concept : Exception Handling; User defined Exception).

11. Write a Java program to implement Multi- Threading (Concept: Multi- Threading by extending Thread class).
12. Write a program for simple Railway Reservation System (Concept : IO Streams: DataInput Stream & DataOutputStream).
13. Write a Java program to display an image (Concept : Pixel Grabber Class : Getting pixels of an image)
14. Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.
15. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

### **Web Links**

1. <https://www.youtube.com/watch?v=LxqOecFpHjo>
2. <https://www.youtube.com/watch?v=5u8rFbpdvds>
3. [https://www.youtube.com/watch?v=Sny9Rta3k\\_Q](https://www.youtube.com/watch?v=Sny9Rta3k_Q)

### **COURSE LEARNING OUTCOMES**

After completion of the Programming in Java Laboratory course, the student can be able to:

CLO1: Describe the knowledge on Java Compiler and work with eclipse platform

CLO2: Develop the control statements in Java.

CLO3: Experiment the concepts of multi-threading and exception handling

CLO4: Learn the concepts of graphics programming.

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**B. C. A. SYLLABUS - III YEAR (DISTANCE MODE)**

<b>COURSE TITLE</b>	<b>:</b>	<b>Programming in Python - Laboratory</b>
<b>COURSE CODE</b>	<b>:</b>	<b>BCAS-P8</b>
<b>COURSE CREDIT</b>	<b>:</b>	<b>2</b>

**COURSE OBJECTIVES**

While studying the Programming in Python Lab course, the student shall be able to:

CO1: Learn how to write program in Python basics.

CO2: Experiment the program in Python data structures.

CO3: Demonstrate how to handle files.

CO4: Learn how to connect with Database.

**List of Experiments**

1. Create a simple calculator to do all the arithmetic operations
2. Write a program to use control flow tools like if.
3. Write a program to use for loop
4. Data structures
  - i. use list as stack
  - ii. use list as queue
  - iii. tuple, sequence
5. Create new module for mathematical operations and use in your program
6. Write a program to read and write files, create and delete directories
7. Write a program with exception handling
8. Write a program using classes
9. Connect with MySQL and create address book
10. Write a program using string handling and regular expressions
11. Program to parse apache log file
12. Create a GUI program using pygtk.

## **Web Links**

1. <https://www.youtube.com/watch?v=FP6qQgJI5f4>
2. [https://www.youtube.com/watch?v=\\_uQrJ0TkZlc](https://www.youtube.com/watch?v=_uQrJ0TkZlc)
3. <https://www.youtube.com/watch?v=AHkPH4VIWYA>

## **COURSE LEARNING OUTCOMES**

After completion of the Programming in Python Lab course, the student can be able to:

CLO1: Demonstrate how to write program in Python basics.

CLO2: Experiment the program in Python data structures.

CLO3: Learn to handle files in python.

CLO4: Experiment how to connect with Database.

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**B. C. A. SYLLABUS - III YEAR (VI SEMESTER)**

**COURSE TITLE : VISUAL PROGRAMMING**  
**COURSE CODE : BCAS-61**  
**COURSE CREDIT : 4**

**COURSE OBJECTIVES**

While studying the Visual Programming course, the student shall be able to:

- CO1: Use a modern IDE to visually and programmatically create programs with GUI's
- CO2: Develop forms and events.
- CO3: Learn the VB data types and control structure
- CO4: Design and implement applications using Library Functions
- CO5: Create a Database in VB.

**BLOCK I: INTRODUCTION TO WINDOWS PROGRAMMING**

Introduction to Windows Programming and Visual Basic: Components of Windows Programming - Graphical User Interface – Window and its elements – Dialog Box – Drop-Down and Pop-Up menus – Visual Basic – Event-Driven Programming – Steps in Building a Project - User Interface Design – Writing Code – Visual Basic IDE – Creating and Running a simple project

**BLOCK II: VISUAL BASIC FORMS AND CONTROLS:**

Form – Tool Box controls – Property window – Design and Run-time properties – Events – Keyboard, Mouse, Code and System events - Visual Basic Object oriented programming – Creating buttons at run-time through object declaration - Screen, Printer, Error Objects.

**BLOCK III: VISUAL BASIC PROGRAMMING:**

Visual Basic Data Types - Constants: predefined constants – User-Defined constants – Variables - Scope Rules – Control Structures – If – Select Case – Loops – FOR , DO, WHILE loops – Goto – On Goto statements - Event procedures – User defined procedures.

## **BLOCK IV: LIBRARY FUNCTIONS**

Library functions – Numeric, String, Boolean and miscellaneous functions – Sub Main() procedure - User-defined functions – Public, Private Scope rules – Creating EXE files – Arrays – User-defined data type – Type statement – Control Arrays - Graphics handling – Using multiple forms – Activating a form – Multiple Document Interface – A simple MDI application.

## **BLOCK V VISUAL BASIC ADVANCED FEATURES:**

Creating a Database in VB – Accessing an external database with Data Control – Object Linking and Embedding (OLE) - Linking and embedding an excel worksheet with VB project – Using third-party controls in VB - Creating an Active X control project – Activating other applications from VB – Windows Application Program Interface functions (WINAPI)

### **Reference Books:**

1. An Introduction to Programming using Visual Basic, David I. Schneider, Prentice Hall, 1995
2. Ready-to-Run Visual Basic Algorithms, Rod Stephens, J. Wiley Publication, 1998
3. “Visual Basic 6 from ground up” Garry Cornell, TMH, 1999.

### **Web Links**

1. <https://www.youtube.com/watch?v=-HNNCem5MoQ>
2. [https://www.tutorialspoint.com/vb.net/vb.net\\_basic\\_controls.htm](https://www.tutorialspoint.com/vb.net/vb.net_basic_controls.htm)
3. <https://www.youtube.com/watch?v=vTS0-BWHE0M>
4. <https://www.youtube.com/watch?v=XdSbp1A6eQc>
5. <https://www.youtube.com/watch?v=oWRxt48lRzo>

## **COURSE LEARNING OUTCOMES**

After completion of the Visual Programming course, the student can be able to:

- CLO1: Demonstrate knowledge of programming terminology and how applied using Visual Basic
- CLO2: Develop a Graphical User Interface (GUI) based on problem description.
- CLO3: Develop an Event Planning Chart based on problem description so as to define the processing that is to occur based on specific events.
- CLO4: Develop an Algorithm to verify processing is accurate
- CLO5: Develop and debug applications using Visual Basic 2010 (or version required for the course) that runs under Windows operating system.

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**B. C. A. SYLLABUS - III YEAR (VI SEMESTER)**

**COURSE TITLE** : **VISUAL PROGRAMMING LABORATORY**  
**COURSE CODE** : **BCAS-P9**  
**COURSE CREDIT** : **2**

**COURSE OBJECTIVES**

While studying the Visual Programming practical course, the student shall be able to:

- CO1: Demonstrate knowledge of programming terminology and how applied using Visual Basic
- CO2: Develop a Graphical User Interface (GUI) based on problem description
- CO3: Develop an Event Planning Chart based on problem description so as to define the processing that is to occur based on specific events
- CO4: Develop an Algorithm to verify processing is accurate

**List of Experiments**

1. Write a program to design a simple calculator to perform addition, subtraction, multiplication and division (use function for the calculation)
2. Write an application with a derived list box, DirListBox, FileListBox and image control and using through load an image at runtime
3. Write a program to change the color of text using scrollbar
4. Write an application to move an image using a timer and command button
5. Write an application that changes the font, size and color for a given text box.
6. Write an application that calculates the age from the given data of birth. (use DTP control)
7. Write an application for encryption and decryption of string using random number
8. Write an application to show the usage of shape and line control.
9. Write an application by using navigation and manipulation method.
10. Write an application to display item details using database

## **Web Links**

1. <https://www.youtube.com/watch?v=Jfu2w7HS7Yw>
2. <https://www.youtube.com/watch?v=bk2TCojthDs>
3. <https://www.youtube.com/playlist?list=PLG4AvFYItCViiBOv6tJA6vXkc6UVIxAN6>

## **COURSE LEARNING OUTCOMES**

After completion of the Visual Programming practical course, the student can be able to:

CLO1: Design, create, build, and debug Visual Basic applications.

CLO2: Apply arithmetic operations for displaying numeric output.

CLO3: Apply decision structures for determining different operations.

CLO4: Write and apply loop structures to perform repetitive tasks.

CLO5: Write and apply procedures, sub-procedures, and functions to create manageable code

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**B. C. A. SYLLABUS - III YEAR (VI SEMESTER)**

**COURSE TITLE : Mini Project**  
**COURSE CODE : BCAS-P10**  
**COURSE CREDIT : 2**

**COURSE OBJECTIVES**

While completing the project, the student shall be able to:

The objective of the Project Course is to help the students to study, analyze and design software or utility for research problems focused in the recent journals or application of such software related to problems in the area of Computer Application. The development of algorithms and derivation with respect to theoretical Computer Science in relevance to performance comparison, which will improve the skills of software development of the students, will be another objective of the mini project course.

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**B. C. A. SYLLABUS – III YEAR (ELECTIVE I)**

**COURSE TITLE : Principles of Management**  
**COURSE CODE : BCASE-01**  
**COURSE CREDIT : 3**

**COURSE OBJECTIVES**

While studying the Principles of Management course, the student shall be able to:

- CO1: Learn the basic concepts of Management
- CO2: Explain how to do planning and decision making
- CO3: Gather information about how to organize in management
- CO4: Demonstrate the selection process.
- CO5: Aware about controlling and budgeting in management

**BLOCK I: INTRODUCTION**

Management – Features, Functions – Management as an art, Science, Profession – Evolution of management thoughts.

**BLOCK II: PLANNING**

Planning – Process, Importance, Nature and Scope, Types, Steps in Planning. Objectives, Policies, Procedures, Strategy - Decision making: Types of decisions, difficulties in decision making – Management by Objectives.

**BLOCK III: ORGANIZING**

Organizing – Features, Importance – Principles of organizations – Types - Organization structure – Delegation – Span of control - Line and staff relationship – Use of staff units and committees.

**BLOCK IV: STAFFING**

Staffing – Sources of recruitment – Selection process – Training - Directing – Nature and purpose – Communication process.

## **BLOCK V: CONTROLLING AND BUDGETARY**

Need for Coordination – Controlling - Importance and functions of control – Control process - Budgetary and non- budgetary control.

### **Reference Books:**

1. Rustom Davar Management Process
2. Management Process, Rustom Davar
3. Principles of Management, L.M. Prasad
4. Business Management, Dinkar & Pagare
5. Essentials of Management, Koontz & O Donnell
6. Principles of Management, Sherlekar.

### **Web Links**

1. <https://www.youtube.com/watch?v=5RlnfakZ2I8>
2. <https://www.youtube.com/watch?v=dHM0AoNhiYk>
3. [https://www.youtube.com/watch?v=HkFKfHcN\\_Cw](https://www.youtube.com/watch?v=HkFKfHcN_Cw)
4. <https://www.youtube.com/watch?v=mg8F7vfC04M>
5. <https://www.youtube.com/watch?v=0OJ2PIGiwJE>

## **COURSE LEARNING OUTCOMES**

After completion of the Principles of Management course, the student can be able to:

- CLO1: Develop the basic concepts of Management.
- CLO2: Demonstrate how to do planning and decision making
- CLO3: Gather information about how to organize in management
- CLO4: Demonstrate the selection process.
- CLO5: Explain about controlling and budgeting in management

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**B. C. A. SYLLABUS - III YEAR (Elective I)**

**COURSE TITLE** : **Management Information Systems**  
**COURSE CODE** : **BCASE-02**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Management Information Systems course, the student shall be able to:

- CO1: Learn the basic concepts of Management Information Systems
- CO2: Identify the types of information systems.
- CO3: State the business information systems.
- CO4: Categorize the Financial Information System
- CO5: Learn about the various tools available for system development

**BLOCK I: INTRODUCTION TO MIS**

Concept, Definition, Role, Impact, Importance, - MIS and Uses. Approaches to management, Functions of Manager - Manager and the environment, Management as a control System.

**BLOCK II: TYPES OF INFORMATION SYSTEMS**

Decision Making, Concepts- Methods, Functions of DSS - Executive information System, MIS, TPS, ES.

**BLOCK III: BUSINESS INFORMATION SYSTEM:**

Functional Information Systems- Marketing Information - Manufacturing Information System- Quality Information System.

**BLOCK-IV FINANCIAL INFORMATION SYSTEMS**

Financial and Accounting Information System- Human Resource Information System.

## **BLOCK V: SYSTEM DEVELOPMENT LIFE CYCLE**

System Development Life Cycle & Tools for IS Development - System Development- System Analysis, System Design, System Development Life Cycle - Preliminary Investigation- Tools for System Development - DFD- Data Dictionary- Decision Trees.

### **Text Books:**

1. Management Information System, W. S. Jawadekar , Tata Mcgraw hill
- 2 .Management Information System A Managerial Perspective, Uma G. Gupta, Galgotia Publications Pvt. Ltd. 1998.

### **References Books:**

1. Management Information System, W. S. Jawadekar , Tata Mcgraw hill
2. Management Information System A Managerial Perspective, Uma G. Gupta, Galgotia Publications Pvt. Ltd. 1998.

### **Web Links**

1. <https://www.youtube.com/watch?v=-18Py3sX5sM>
2. <https://www.youtube.com/watch?v=HsbjxUYHyPM>
3. <https://www.youtube.com/watch?v=tOvNpNTyPPk>
4. <https://www.youtube.com/watch?v=Gz5LxhlYZ8o>
5. <https://www.youtube.com/watch?v=shNOYFlmBOU>

## **COURSE LEARNING OUTCOMES**

After completion of the Management Information Systems course, the student can be able to:

CLO1: Explain the basic concepts of Management Information Systems

CLO2: Identify the types of information systems.

CLO3: State the business information systems.

CLO4: predict the Financial Information System

CLO5: Demonstrate the various tools available for system development.

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**B. C. A. SYLLABUS - III YEAR (Elective I)**

**COURSE TITLE** : **Professional Ethics**  
**COURSE CODE** : **BCASE-03**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Professional Ethics course, the student shall be able to:

- CO1: Create awareness on Human Values.
- CO2: Develop the professional Ethics.
- CO3: Develop the Ethical Dilemma of an Professional.
- CO4: Explain the Global Issues
- CO5: Assess the safety and responsibilities

**Block 1. HUMAN VALUES**

Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence –Character.

**Block 2. ETHICS**

Senses of 'Professional Ethics' - variety of moral issued - types of inquiry - moral dilemmas – moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories. Valuing Time – Co-operation – Commitment.

**Block 3. ETHICAL DILEMMAS, SOURCES AND THEIR RESOLUTIONS:**

What is an Ethical Dilemma, Sources of Ethical Behaviour, Code of Personal Ethics for Employees, How to Resolve an Ethical Problem, How to Resolve Ethical Dilemmas.

**Block 4. SAFETY, RESPONSIBILITIES AND RIGHTS**

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island.

**Block 5. GLOBAL ISSUES**

Multinational corporations - Environmental ethics - computer ethics - weapons development – Professional as expert witnesses and advisors -moral leadership.

## **TEXT BOOKS**

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

## **REFERENCES**

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

## **Web Links**

1. <https://www.youtube.com/watch?v=Y8eWo1qgDQQ>
2. <https://www.youtube.com/watch?v=PxVFvDh4tPg>
3. <https://www.youtube.com/watch?v=iJqQQAtxQUg>
4. <https://www.youtube.com/watch?v=K-2HgXtIzmo>
5. [https://www.youtube.com/watch?v=Z\\_3VfpthmTs](https://www.youtube.com/watch?v=Z_3VfpthmTs)

## **COURSE LEARNING OUTCOMES**

After completion of the Professional Ethics course, the student can be able to:

CLO1: Build awareness on professional Ethics and Human Values.

CLO2: Learn social responsibility of a Professional.

CLO3: Demonstrate ethical dilemma while discharging duties in professional life.

CLO4: Learn the Global Issues

CLO5: Assess the safety and responsibilities

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### B. C. A. SYLLABUS - III YEAR (Elective II)

**COURSE TITLE : Constitution of India**

**COURSE CODE : BCASE-04**

**COURSE CREDIT : 3**

#### COURSE OBJECTIVES

While studying the Constitution of India course, the student shall be able to:

- CO1: Identify the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- CO2: Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- CO3: Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- CO4: Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
- CO5: Describe about the election commission.

**BLOCK I HISTORY OF MAKING OF THE INDIAN CONSTITUTION:** History, Drafting Committee, (Composition & Working). Philosophy of the Indian Constitution: Preamble, Salient Features.

**BLOCK II CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES:** Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

**BLOCK III ORGANS OF GOVERNANCE:** Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

**BLOCK IV LOCAL ADMINISTRATION:** District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat:

Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.

**BLOCK V ELECTION COMMISSION:** Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

### **Reference Books**

1. The Constitution of India,1950(Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7 th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

### **Web Links**

1. <https://www.youtube.com/watch?v=XrKEtEzqZ7g>
2. <https://www.youtube.com/watch?v=bI4XkJI2CHw>
3. <https://www.youtube.com/watch?v=MAWQS-1X7bw>
4. <https://www.youtube.com/watch?v=r-PUo0fuaT4>

### **COURSE LEARNING OUTCOMES**

After completion of the Constitution of India course, the student can be able to:

- CLO1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- CLO2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- CLO3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- CLO4: Discuss the passage of the Hindu Code Bill of 1956.

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**B. C. A. SYLLABUS - III YEAR (Elective II)**

**COURSE TITLE** : **E- Learning**  
**COURSE CODE** : **BCASE-05**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the e-Learning course, the student shall be able to:

- CO1: Learn about the basic concepts and history of e-Learning
- CO2: Design the role of tutor and learn the content development.
- CO3: Explain the philosophy of E-Learning
- CO4: Learn the visual communication techniques
- CO5: Explain the implementation strategy of E-Learning.

**BLOCK I INTRODUCTION**

E-Learning - E-Learning cycle - E-Learning types - challenges and support Blockies – cognitive presence – Approaches to design E-Learning - E-Learning framework – 6C framework - E-Learning Tools

**BLOCK II E-LEARNING STRATEGY**

Role of tutor - E-Learning strategy - Blended E-Learning – M-Learning- problem based learning- Enterprise learning- Corporate Learning- Web based Learning - Pod casting - Learning Management systems – Content development process – E-Learning standards- SCORM standard- managing e-learning quality - case studies.

**BLOCK III PRINCIPLES OF E-LEARNING**

Philosophy of E-Learning – theory of learning – Applying principles of multimedia - Applying principles of contiguity - Applying principles of modality - Applying principles of redundancy - Applying principles of coherency - Applying principles of personalization- web-based learning comm. Blockies - knowledge sharing and Knowledge management in e-learning- social networks and social media in e-learning

## **BLOCK IV DESIGN**

On line E-Learning technologies – visual communication techniques- Computer-based technologies - Computer-mediated communication (CMC) – Assessment and evaluation- Organizing and designing learning sequences, Characteristics of Interactive Online Learning Media.

## **BLOCK V IMPLEMENTATION**

Leverages example in E-Learning – collaborative E-Learning- Learner control in E-Learning- guidelines to solve issues in E-Learning – Implementation of an E-Learning Course Content for a complete online course, Research in content retrieval and generation for E-Learning, Role of cloud and semantic Grid in E-Learning

### **Reference book:**

1. D.Randy Garrison “E-Learning in the 21st century a framework for research and practice”, 2nd edition, Taylor and Francis, 2011.
2. Robin Mason, “E-Learning : the key concepts”, Routledge, 2007.
3. William Horton, “E-Learning by Design”, Pfeiffer Wiley, 2006.
4. John Gardner, Bryn Holes, “E-Learning : Concepts and practice” SAGE Publications, 2006.
5. R.C.Clark and R.E.Mayer, “E-Learning and the science of instruction”, Pfeiffer Wiley, 2011.
6. Mark J Rosenberg, “E-Learning: strategies for delivering knowledge in the Digital Age”, McGraw- Hill, 2001.

### **Web links**

1. <https://www.aupress.ca/books/120258-emergence-and-innovation-in-digital-learning/>
2. <https://opentextbc.ca/teachinginadigitalage/part/chapter-2-the-nature-of-knowledge-and-the-implications-for-teaching/>
3. <https://www.coursera.org/learn/elearning>

## **COURSE LEARNING OUTCOMES**

After completion of the e-Learning course, the student can be able to:

- CLO1: Explain the basic concepts and history of e-Learning
- CLO2: Design the role of tutor and learn the content development.
- CLO3: Demonstrate the philosophy of E-Learning
- CLO4: Invent the visual communication techniques
- CLO5: Design the implementation strategy of E-Learning.

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**B. C. A. SYLLABUS - III YEAR (Elective II)**

**COURSE TITLE** : **Big Data Analytics**  
**COURSE CODE** : **BCASE-06**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Big Data Analytics course, the student shall be able to

CO1: Familiarize with R Programming.

CO2: Create data analysis using R and HADOOP Integrated Programming Environment.

CO3: Describe the analytics for Big data ‘at Rest’ and Real-Time Analytical Processing for Big data ‘in Motion’.

CO4: Explain the Pig Data model and Pig scripts.

CO5: Create query for Big Data using Hive.

**BLOCK I INTRODUCTION TO R PROGRAMMING**

Introduction to R –Vectors –Filtering –Matrices –Creating Matrices –Applying Functions to Matrix Rows and Columns –Lists –Creating List –General List Operations - Data Frames – Creating Data Frames –Matrix like Operations in Frames –Applying Functions to Data Frames – Factors and Tables - Math and Simulations in R –Input/Output –Reading and Writing Files – Graphics –Creating Three-Dimensional Plots –Linear Models –Non-linear models –Clustering.

**BLOCK II DATA ANALYSIS USING R AND HADOOP**

Features of R Language -HADOOP Features –HDFS and MapReduce architecture –R and Hadoop Integrated Programming Environment-RHIPE - Introduction –Architecture of RHIPE – RHIPE function reference. RHADOOP Introduction –Architecture of RHADOOP –RHADOOP function reference, SQL on HADOOP.

**BLOCK III ANALYTICS FOR BIG DATA STREAMS**

IBM Pure Data Systems –Netezza’s Design Principles –The Netezza Appliance –Extending the Netezza Analytics –Real-Time Analytical Processing - InfoSphere Streams Basics – InfoSphereStreams Working –enterprise class –industry use cases –Indexing Data from Multiple Sources.

## **BLOCK IV PROGRAMMING WITH PIG**

Introduction –installation and execution –PIG Data Model –PIG Latin –Input, Output-Relational Operators –User Defined Functions –Join Implementations - Integrating Pig with Legacy Code and Map Reduce –Developing and Testing Pig Latin Scripts –Embedding Pig Latin in Python – Evaluation Function in Java-Load Functions –Store Functions.

## **BLOCK V PROGRAMMING WITH HIVE**

Introduction –Data Types and File Formats –Databases in Hive –HiveQL - Data Definition – Data Manipulation –Queries –Views –Indexes –Schema Design.

## **REFERENCES:**

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White “Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2011.
3. Zikopoulos, P., Parasuraman, K., Deutsch, T., Giles, J., & Corrigan, D.V Harness the Power of Big Data The IBM Big Data Platform. McGraw Hill Professional, 2012.
4. Prajapati, V, “Big Data Analytics with R and Hadoop”, Packt Publishing Ltd, 2013.
5. Gates, A. Programming Pig.”O’Reilly Media, Inc.”, 2011.
6. Capriolo, E., Wampler, D., & Rutherglen, J., “Programming Hive”, O’ReillyMedia, Inc.”,2012
7. Norman Matloff , “The Art of R Programming: A Tour of Statistical Software Design”, NoStarch Press, 2011.
8. Jared P. Lander, “R for Everyone: Advanced Analytics and Graphics”, Addison-Wesley Data & Analytics Series, 2013.

## **Web Links**

1. 2 IT - UNIT-1 Start Learning R.pdf (gvpcew.ac.in)
2. Chapter 10 Data Frames | Introduction to Programming with R (discdown.org)
3. Creating Graphs With ggplot2 | Data Analysis and Processing with R based on IBIS data (bookdown.org)
4. Chapter 13 Simulations | R Lecture Notes (ufl.edu)
5. Reading and Writing Data to and from R - MAKE ME ANALYST

## **COURSE LEARNING OUTCOMES**

After completion of the Big Data Analytics course, the student can able to:

- CLO1: Design applications using R
- CLO2: Design applications using RHADOOP
- CLO3: Develop analytic applications for data Streams.
- CLO4: Develop Pig scripts for Big data applications.
- CLO5: Design Big data applications schema and use HIVE QL.

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**B. C. A. SYLLABUS - III YEAR (Elective II)**

**COURSE TITLE** : **Financial Accounting**  
**COURSE CODE** : **BCASE-07**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Financial Accounting course, the student shall be able to:

- CO1: Learn the basic concepts of Accounting and its functions
- CO2: Describe knowledge about the various types of Accounting
- CO3: Learn about flow analysis
- CO4: Explain about the theory of costing.
- CO5: Formulate the importance of Budgeting.

**BLOCK I: ACCOUNTING AND ITS FUNCTION**

Fundamentals of Accounting: Principle of Accounting - Accounting and its Function: Double Entry Book Keeping - Ledger – Trial Balance – Rectification of Errors – Trading Profit and Loss Account – Balance Sheet - Journal – Rules of Journalising.

**BLOCK II: TYPES**

Financial concepts : Financial Statement – Nature of Financial Statements – Limitations of Financial Statements - Types of Analysis – Tools of Analysis – Trend Analysis – Comparative Statement.

**BLOCK III: FLOW ANALYSIS**

Ratio Analysis: Types of Ratio – Factors affecting efficiency of Ratio – Limitations of Ratio - Fund Flow Analysis - Cash Flow Analysis.

**BLOCK IV: COSTING BUDGETING**

Costing: Marginal Costing – Break even analysis – Application of Marginal Costing – Limitations

## **BLOCK V: BUDGETING**

Budgeting: Importance of Budgeting – Budget factors.

### **Reference Books:**

1. Advanced Accountancy, R.L.Gupta, and M.Radhasamy, Sultan Chand & Sons.
2. Principles of Management Accounting, Man Mohan and Goyal.
3. Studies in Cost Accounting, P. Das Gupta, Premier Book company.

### **Web Links**

1. <https://www.youtube.com/watch?v=756D5Rx-p94>
2. <https://www.youtube.com/watch?v=jhtVVJxbPU0>
3. <https://www.youtube.com/watch?v=0OJ2PIGiwJE>
4. <https://www.youtube.com/watch?v=S3DGODVeSqI>

### **COURSE LEARNING OUTCOMES**

After completion of the Financial Accounting course, the student can be able to:

CLO1: Explain the basic concepts of Accounting and its functions

CLO2: Demonstrate knowledge about the various types of Accounting

CLO3: Learn about flow analysis

CLO4: Teach the theory of costing.

CLO5: Formulate the importance of Budgeting.

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**B. C. A. SYLLABUS - III YEAR (Elective II)**

**COURSE TITLE** : **Data Mining**  
**COURSE CODE** : **BCASE-08**  
**COURSE CREDIT** : **3**

**COURSE OBJECTIVES**

While studying the Data Mining course, the student shall be able to

- CO1: Explain the major issues in Data mining
- CO2: Develop knowledge on Schemas of a Data Warehouse, OLAP and Cube Technology.
- CO3: Learn the Methods for Mining Frequent Patterns, Associations and Correlations.
- CO4: Learn the Basic Concepts and Methods for Classification.
- CO5: Use the basic concepts and Methods for Data Clustering.

**Block I Introduction**

Introduction – Kinds of Data and Patterns That Can Be Mined – Technologies Used – Kinds of Applications Targeted – Major Issues in Data Mining – Data Objects and Attribute Types – Basic Statistical Description of Data – Data Visualization – Measuring Data Similarity and Dissimilarity – Data Preprocessing – Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization.

**Block II Data warehouse**

Data warehouse – Basic Concepts – Operational Database Systems and Data Warehouses – Architecture of a Data Warehouse – Extract, Transform and Load – Metadata – Data Cube and OLAP – Multidimensional Data Model – Star Schema – Snowflake Schema – Starflake Schema – Fact Constellation Schema – Dimensions – Measures – OLAP Operations – Starnet Query Model for Querying Multidimensional Databases – Data Warehouse Design and Usage – Data Warehouse Implementation – ROLAP – MOLAP – HOLAP – Data Generalization by Attribute-Oriented Induction – Data Cube Technology – Data Cube Computation: Preliminary Concepts – Data Cube Computation Methods – Processing Queries by Exploring Cube Technology – Multidimensional Data Analysis in Cube Space.

### **Block III Mining Frequent Patterns**

Mining Frequent Patterns, Associations, and Correlations – Basic Concepts – Market Basket Analysis – Frequent Itemsets, Closed Itemsets, and Association Rules – Frequent Itemset Mining Methods – Apriori Algorithm – Finding Frequent Itemsets by Confined Candidate Generation – Generating Association Rules from Frequent Itemsets – Improving the Efficiency of Apriori – Pattern-Growth Approach for Mining Frequent Itemsets – Mining Frequent Itemsets Using Vertical Data – Mining Closed and Max Patterns – Pattern Evaluation Methods – Association Analysis to Correlation Analysis – Comparison of Pattern Evaluation Measures – Pattern Mining in Multilevel, Multidimensional Space – Mining Multilevel Associations – Mining Multidimensional Associations – Mining Quantitative Association Rules – Mining Rare Patterns and Negative Patterns – Constraint-Based Frequent Pattern Mining – Metarule-Guided Mining of Association Rules – Constraint-Based Pattern Generation: Pruning Pattern Space and Pruning Data Space.

### **Block IV Classification**

Classification – General Approach to Classification – Decision Tree Induction – Attribute Selection Measures – Tree Pruning – Scalability and Decision Tree Induction – Visual Mining for Decision Tree Induction – Bayes Classification Methods – Bayes' Theorem – Naïve Bayesian Classification – Rule-Based Classification – Using IF-THEN Rules for Classification – Rule Extraction from a Decision Tree – Rule Induction Using a Sequential Covering Algorithm – Model Evaluation and Selection – Metrics for Evaluating Classifier Performance – Holdout Method and Random Subsampling – Cross-Validation – Bootstrap – Model Selection Using Statistical Tests of Significance – Comparing Classifiers Based on Cost-Benefit and ROC Curves – Techniques to Improve Classification Accuracy – Ensemble Methods – Bagging – Boosting and AdaBoost – Random Forests – Improving Classification Accuracy of Class-Imbalanced Data – Classification by Backpropagation – Support Vector Machines.

### **Block V Cluster Analysis**

Cluster Analysis – Requirements for Cluster Analysis – Overview of Basic Clustering Methods – Partitioning Methods –  $k$ -Means: A Centroid-Based Technique –  $k$ -Medoids: A Representative Object-Based Technique – Hierarchical Methods – Agglomerative versus Divisive Hierarchical Clustering – Distance Measures in Algorithmic Methods – BIRCH: Multiphase Hierarchical Clustering Using Clustering Feature Trees – Chameleon: Multiphase Hierarchical Clustering Using Dynamic Modeling – Probabilistic Hierarchical Clustering – Density-Based Methods –

DBSCAN: Density-Based Clustering Based on Connected Regions with High Density – OPTICS: Ordering Points to Identify the Clustering Structure – DENCLUE: Clustering Based on Density Distribution Functions – Grid-Based Methods – STING: STatistical INformation Grid – CLIQUE: An Apriori-like Subspace Clustering Method – Evaluation of Clustering – Assessing Clustering Tendency – Determining the Number of Clusters –Measuring Clustering Quality.

### **Text Books**

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition, July 6, 2011.
2. Ian H. Witten, Eibe Frank, Mark A. Hall, “Data Mining: Practical Machine Learning Tools and Techniques”, Elsevier; Third edition, 2014.

### **Text Book:**

2. Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining: Concepts and Techniques”, Third Edition, Morgan Kaufmann Publishers, 2011.

### **References:**

5. Arun K Pujari, “Data Mining Techniques”, Fourth Edition, Orient BlackSwan, 2016.

### **Web Links**

1. <https://www.youtube.com/watch?v=J326LIUrZM8>
2. [https://www.youtube.com/watch?v=-WxbURm\\_YGA](https://www.youtube.com/watch?v=-WxbURm_YGA)
3. [https://www.youtube.com/watch?v=6bx\\_MGQqWBQ](https://www.youtube.com/watch?v=6bx_MGQqWBQ)
4. <https://www.youtube.com/watch?v=CwjLMV52tzI>

### **COURSE LEARNING OUTCOMES**

After completion of the Data Mining, the student can able to:

CLO1: Learn the major issues in Data mining.

CLO2: Demonstrate knowledge on Schemas of a Data Warehouse, OLAP and Cube Technology.

CLO3: Explain the Methods for Mining Frequent Patterns, Associations and Correlations.

CLO4: Learn the Basic Concepts and Methods for Classification.

CLO5: Use the basic concepts and Methods for Data Clustering.

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**B. C. A. SYLLABUS - III YEAR (Non-Major Elective)**

**COURSE TITLE : Office Automation**

**COURSE CODE : BCAS-13**

**COURSE CREDIT : 2**

**COURSE OBJECTIVES**

While studying the Office Automation course, the student shall be able to

CO1: Learn about the basics of computer.

CO2: Craft professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.

CO4: Familiarize the students in preparation of documents and presentations with office automation tools.

CO5: Discuss about the internet and e- mails.

**BLOCK -1 BASICS OF COMPUTER**

**Unit -1** History & Generation of Computer, Applications of Computer, Advantages of Computer, Characteristics of Computer, Memory Units.

**BLOCK – 2 MS-WORD**

**Unit -2** Introduction to word –working with documents

**Unit -3** formatting page – formatting paragraph- shortcut keys.

**BLOCK – 3 MS-EXCEL**

**Unit -4** MS-Excel: Basics – Menus – Tool Bars

**Unit -5** Working with spreadsheets- shortcut keys.

**BLOCK – 4 MS-POWERPOINT**

**Unit -6** Introduction to presentation – Templates – Layouts

**Unit -7** Creating and Formatting presentation.

**BLOCK – 5: INTRODUCTION TO INTERNET AND E-MAILS:**

**Unit- 8** World Wide Web (www) - History, Working-Web Browsers and its functions, Concept of Search Engines, Searching the Web. **E-Mail:** Creating an email-ID, e-mail reading, saving, printing, forwarding and deleting the mails, checking the mails, viewing and running file attachments, addressing with cc and bcc.

## **TEXT BOOK**

1. Sanjay Saxena, —MS-Office 2000 for everyone!, Vikas Publishing House Pvt. Ltd, Reprint 2006.

## **REFERENCE BOOKS**

1. Nellai Kannan, —MS-Office, Nels Publications, 3rd Edition, 2004.
2. John Walkenbach, Herb Tyson, Michael R.Groh, Faithe Wempen and Lisa A.Bucki , — Microsoft Office 2010 Bible —, Wiley India Pvt. Ltd , Reprint 2010.

## **Web Links**

1. <https://psu.pb.unizin.org/ist110/chapter/5-2-human-computer-interaction/>
2. <http://www.igntu.ac.in/eContent/IGNTU-eContent-799042056712-MA-Linguistics-4-HarjitSingh-ComputationalLinguistics-1.pdf>
3. <https://www.geeksforgeeks.org/working-with-spreadsheets-in-ms-excel/>
4. [http://www.bcpls.org/Docs/Computer\\_Handouts/Word101.pdf](http://www.bcpls.org/Docs/Computer_Handouts/Word101.pdf)
5. <https://spreadsheeto.com/how-to-use-excel/>
6. [http://www.bcpls.org/Docs/Computer\\_Handouts/PowerPoint10/1.pdf](http://www.bcpls.org/Docs/Computer_Handouts/PowerPoint10/1.pdf)

## **COURSE LEARNING OUTCOMES**

After completion of the Office Automation, the student can able to:

- CLO1: Memorize the computer basics
- CLO2: Perform documentation
- CLO3: Work in spread sheets
- CLO4: Perform presentation skills
- CLO5: Aware with internet and e-mails.

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