

**Under- Graduate Programme  
in Computer Science**

**Courses of study, Schemes of Examinations  
& Syllabi**  
(Choice Based Credit System)



**DEPARTMENT OF COMPUTER SCIENCE**

**BISHOP HEBER COLLEGE (Autonomous)**  
(Reaccredited with 'A' Grade (CGPA – 3.58/4.0) by the NAAC &  
Identified as College of Excellence by the UGC)  
DST – FIST Sponsored College &  
DBT Star College  
TIRUCHIRAPPALLI – 620 017  
TAMIL NADU, INDIA

**2016 – 2017**

## Under – Graduate Programme in Computer Science

### Structure of the Curriculum

Parts of the Curriculum	No. of Courses	Credits
<b>Part – I</b> : Language	4	12
<b>Part – II</b> : English	4	12
<b>Part – III</b>		
Major		
Core	8	40
Core Practical	6	17
Elective	3	15
Allied	6	22
Group Project	1	5
<b>Part – IV</b>		
SBEC	3	6
NMEC	2	4
VLOC	1	2
Env. Studies	1	2
SBC	1	1
<b>Part – V</b>		
Extension Activities	1	1
Gender Studies	1	1
<b>Total</b>	<b>42</b>	<b>140</b>

## B.Sc. Computer Science – Programme Description

(For the students admitted from the year 2016 onwards)

SEM	Part	Course	Course Code	Course Title	Prerequisites	Hours / Week	Credits	Marks		
								CIA	ESA	TOTAL
I	I	Tamil I/*	U15TM1L1	செய்யுள், இலக்கிய வரலாறு, உரைநடை, மொழிப்பயிற்சியும் படைப்பாக்கமும்		6	3	25	75	100
	II	English I	U16EGNL1	English Communication Skills-I		6	3	40	60	100
	III	Core I	U15CS101	Introduction to Programming		6	5	25	75	100
		Core Practical I	U15CS1P1	Introduction to Programming Lab		3	2	40	60	100
		Allied I	U14MAZ11	Operation Research		5	4	25	75	100
	IV	Env. Stud.	U16EST11	Environmental Studies		2	2	25	75	100
		VLOC	U14VL1:1/ U14VL1:2	Value Education (RI/MI)		2	2	25	75	100
II	I	Tamil II/*	U15TM2L2	செய்யுள், இலக்கிய வரலாறு, சிறுகதைத்திரட்டு, மொழிப்பயிற்சி & படைப்பாக்கம்		6	3	25	75	100
	II	English II	U16EGNL2	English Communication Skills –II		6	3	40	60	100
	III	Core II	U16CS202	Programming Abstractions	U15CS101	5	5	25	75	100
		Core Practical II	U15CS2P2	Programming Abstractions Lab	U15CS1P1	3	2	40	60	100
		Allied II	U16MAZ22	Numerical Methods		4	4	25	75	100
	IV	Allied III	U16MAZ23	Probability and Statistics		4	4	25	75	100
		SBEC I	U15CSPS1	Business Communication and Collaboration Tools		2	2	40	60	100
III	I	Tamil III/*	U15TM3L3	செய்யுள் - காப்பியங்கள், இலக்கிய வரலாறு, நாவல், மொழிப்பயிற்சி		6	3	25	75	100
	II	English III	U16EGNL3	English for Competitive Examinations		6	3	40	60	100
	III	Core III	U15CS303	Object Oriented System Design	U16CS202	6	5	25	75	100
		Core Practical III	U15CS3P3	Object Oriented System Design Lab	U15CS2P2	3	2	40	60	100
		Allied IV	U13PHZ34	Electricity, Magnetism and Electromagnetism		4	3	25	75	100
	IV	Allied Practical	U13PHZP1	Applied Physics Practicals		3	---	---	---	---
		NMEC I		<b>To be selected from courses offered by other departments</b>		2	2	25/40	75/60	100
IV	I	Tamil IV/*	U15TM4L4	செய்யுள் - நாடகம், இலக்கிய வரலாறு, மொழிப்பயிற்சி		5	3	25	75	100
	II	English IV	U16EGNL4	English through Literature		5	3	40	60	100
	III	Core IV	U15CS404	Database Management Systems	U15CS303	6	5	25	75	100
		Core Practical IV	U15CS4P4	Database Management Systems Lab	U15CS3P3	3	2	40	60	100
		Allied V	U13PHZ45	Solid State Devices and Microprocessor		4	4	25	75	100
	IV	Allied Practical	U13PHZP1	Applied Physics Practicals		3	3	40	60	100
		NMEC II		<b>To be selected from courses offered by other departments</b>		2	2	25/40	75/60	100
		SBC	U16LFS41	Life Skills		2	1	100	--	100

SEM	Part	Course	Course Code	Course Title	Pre requisites	Hours / Week	Cre dits	Marks		
								CIA	ESA	TOTAL
IV	V	Extension Activities	U16ETA41				1	-	-	-
V	III	Core V	U15CS505	Database – Driven Web Design	U15CS404 U15CS303	5	5	25	75	100
		Core VI	U15CS506	Principles of Operating Systems		5	5	25	75	100
		Core VII	U15CS507	Digital Computer Architecture and Microprocessors		5	5	25	75	100
		Core Practical V	U15CS5P5	Database – Driven Web Design Lab	U15CS3P3 U15CS4P4	6	4	40	60	100
		Elective I	U15CS5:1	Introduction to Computer Networks		5	5	25	75	100
			U16CS5:2	Internet of Things				25	75	100
			U16CS5:3	Cloud Computing				25	75	100
	IV	SBEC II	U15CSPS2	Image Editing Tools		2	2	40	60	100
		SBEC III	U15CSPS3	Technical Communication for Computer Scientists		2	2	40	60	100
	VI	III	Core VIII	U15CS608	Fundamentals of Software Engineering		6	5	25	75
Elective II			U15CS6:1	Fundamentals of Computer Graphics		6	5	25	75	100
			U15CS6:2	Multimedia and Applications				25	75	100
			U15CS6:3	XML Basics				25	75	100
Core Practical VI			U15CS6P6	Digital Electronics and Microprocessors Lab		6	5	40	60	100
Elective III			U15CS6:4	Web Applications Development	U15CS505	6	5	25	75	100
			U15CS6:5	Foundations of Enterprise Computing	U15CS303			25	75	100
			U16CS6:6	Mobile Application Development	U15CS303			25	75	100
Project		U15CS6PJ	Project		6	5	---	---	100	
V			U16GST61	Gender Studies			1			
Total							140			4200

SBEC- Skill Based Elective Course  
VLOC- Value added Life Oriented Course  
CIA- Continuous Internal Assessment

NMEC- Non Major Elective Course  
SBC- Skill Based Course  
ESA- End Semester Assessment

* Other Languages	Hindi	Sanskrit	French		Hindi	Sanskrit	French
Semester I	U14HD1L1	U15SK1L1	U14FR1L1	Semester III	U14HD3L3	U15SK3L3	U14FR3L3
Semester II	U14HD2L2	U15SK2L2	U14FR2L2	Semester IV	U14HD4L4	U15SK4L4	U14FR4L4

NMEC offered by the Department:

1. Basics of Computer Programming
2. Fundamentals of Information Technology

U15CS3E1  
U15CS4E2

## INTRODUCTION TO PROGRAMMING

**Semester: I**  
**Code: U15CS101**

**Total Hrs. : 90**  
**Credits : 5**

### Objectives

On completion of the course, the students will

1. understand the programming techniques
2. acquire the basics of the C Programming
3. know the concepts of functions, arrays, structures and pointers

**Unit 1:** Introduction to C – Overview of computers and interpreters – Structure of a C program - C Character Set – C keywords – Constants – Variables – Data Types – Type conversion – Operators and Expressions.

**Unit 2:** Input and output in C – Decision Statements: if, else-if, break, continue, goto and switch. Loop Control Statements: for, while, do-while.

**Unit 3:** Arrays: Array Initialization and Definition – One Dimensional Array – Two Dimensional Array – Working with strings.

**Functions:** Definition and Declaration – return statement – Types of functions – Functions with operators – Functions with decision and loop statements – Functions with Arrays and pointers – Recursion.

**Unit 4: Pointers :** Pointers Declaration – Arithmetic operations with pointers – Pointers and Arrays – Pointers to functions – Arrays of pointers – Pointer to pointers – Pointers and Strings – Storage class.

**Structures and Union:** Declaration and initialization of structures – Structures within structure – Array of structures – Pointer to structures – Structures and functions – type def – Enumerated Data types – Union.

**Unit 5:** Files: File operation – File I/O structures – Read and write – Command line arguments – Macros Pre – Processor Directives.

### Text Book

1. Ashok N. Kanthane, "Programming with ANSI and TURBO C", Pearson Education, 5<sup>th</sup> impression (Indian) Print, 2008

### Reference Books

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 4<sup>th</sup> Edition, 2008
2. Yeswanth Kanetkar, "Let us C", Infinity Science Press, 8<sup>th</sup> Edition, 2008

## INTRODUCTION TO PROGRAMMING LAB

Semester: I  
Code: U15CS1P1

Total Hrs. : 45  
Credits : 2

### Objectives

On completion of the course, the students will

1. acquire the C Programming Skills
2. learn the concepts of functions, arrays, structures and pointers

#### I. Simple Programs:

1. Finding the largest and smallest of three numbers using if, if-else.
2. Solution of a Quadratic Equation (all cases)
3. Finding the area of different shapes using switch statement.
4. Ascending and descending order of numbers using arrays.  
(Largest and smallest numbers)
5. Sorting of names in alphabetical order.

#### II. Advanced Programs:

6. Matrix operations  
i) Addition ii) Subtraction iii) Multiplication
7. Using Recursive function  
(i) Finding factorial of a number  
(ii) Generating Fibonacci series
8. String manipulations without using string functions  
i) String length ii) String comparison iii) String copy
9. Using function pointers  
i) Palindrome checking ii) Counting characters, words and lines
10. Creating and Processing of Sequential files using structures for Record Description  
i) Payroll ii) Mark List Preparation

## PROGRAMMING ABSTRACTIONS

Semester: II  
Code: U16CS202

Total Hrs. : 75  
Credits : 5

### Objectives

On completion of the course, the students will

1. understand the concepts of object oriented programming in C++
2. know the various types of data structures and their implementation in C++

**Unit 1:** Basic Concepts of Object-Oriented Programming – Benefits of OOP – Applications of OOP. A Simple C++ Program – Structure of C++ Program. Basic Data Types – Control Structures.

**Unit 2: Functions in C++:** The Main Function – Call by Reference – Return by Reference – Inline Functions – Default Arguments – Function Overloading.

**Classes and Objects:** Specifying a Class – Defining Member Functions – Arrays within a Class – Memory Allocation for Objects – Static Data Members – Arrays of Objects – Friendly Functions.

**Unit 3:** Arrays, Linked Lists & Recursion: Singly Linked Lists- Doubly Linked Lists- Circularly Linked Lists- Stacks – Queues.

**Unit 4:** Trees: General Trees- Tree Traversal Algorithms- Binary Trees. - Heaps & Priority Queues: Heaps. Search Trees: Binary Search Trees.

**Unit 5:** Graphs Algorithms: Graphs- Data Structures for graph- Graph Traversals- Directed Graphs- Shortest Paths- Minimum Spanning Trees.

### Text Books

1. E Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill Companies, 6<sup>th</sup> Edition, 2013.
2. Ellis Horowitz, SartajSahni, Dinesh Mehta, "Fundamentals of Data Structures in C++", W.H.Freeman & Co, 4<sup>th</sup> Edition, 2011.

### Reference books

1. Michael T.GoodRich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", John Wiley & Sons, 2<sup>nd</sup> Edition, 2011.
2. Herbert Schildt, "The Complete Reference C++", Tata McGraw Hill 4<sup>th</sup> Edition, 2008.

## PROGRAMMING ABSTRACTIONS LAB

**Semester: II**  
**Code: U15CS2P2**

**Total Hrs. : 45**  
**Credits : 2**

### Objectives:

On completion of the course, the students will

1. understand the concepts of OOPS using C++
2. gain knowledge on the data structures using C++

### Programs:

1. Create an array based stack with 10 elements with push (), pop (), stackFull() and stackEmpty() functions. Write a program to evaluate the given postfix expression using the stack you created.
2. Develop an array based queue called, songPlayer which can hold a maximum of 10 songs. Create a function playSong() which will play the song returned by front() function. The front() will return the song from the queue if queue is not empty. A new song can be added to SongPlayer at rear side through rear() if SongPlayer is not full. Test SongPlayer with your sequence of operations.
3. Write a program to add two polynomials using linked list.
4. Design a program to find shortest path using Dijkstra's algorithm.
5. Build a program to implement doubly linked list.



## **BUSINESS COMMUNICATION AND COLLABORATION TOOLS**

**Semester: II**  
**Code: U15CSPS1**

**Total Hrs. : 30**  
**Credits : 2**

### **SBEC – I**

#### **Objectives:**

On completion of the course, the Students will

1. know the concepts of MS-Word, MS-Excel, MS-PowerPoint and MS-ACCESS
2. understand the application of business communication tools

### **MS – WORD**

- a. Text Manipulation – Change the font type and style.  
Aligning the justification of text and appropriately underline the text.
  - i) Prepare a Bio-Data
  - ii) Prepare a Letter
- b. Usages of Numbering, Bullets, Footers and Headers
  - i) Prepare a document in newspaper format
  - ii) Prepare a document with Bullets, Footers and Headers
- c. Tables and Manipulations – Creation, insertion, deletion (Columns and rows) and usage of Auto format
  - i) Create a Mark Sheet using table and find out of total
  - ii) Create a Calendar and Auto Format
- d. Picture insertion and alignment  
Prepare a Greeting Card
- e. Creation of documents using templates
  - a) Prepare a letter using any template
  - b) Prepare a Biodata using various kinds of templates
- f. Mail Merge  
You want to invite your friends for a birthday party. Use mail merge feature to demonstrate creation of invitation letters for your friends.

### **MS EXCEL**

- 1) Usage of formula and Built-in-functions
- 2) Describe the types of functions
- 3) File manipulation
- 4) Data sorting – Ascending and Descending (both numbers and alphabets)
- 5) Work sheet preparation
- 6) Marklist preparation
- 7) Individual Paybill preparation

- 8) Invoice report
- 9) Inventory
- 10) Electricity Bill Preparation
- 11) Drawing Graphs

## **MS POWER POINT**

- 1. Inserting clip and pictures  
Create a slide show presentation for a seminar chooses your own topics.
  - a) Enter the text in outline view
  - b) Create non-bulleted and bulleted body text
  - c) Apply the appropriate text attributes
- 2. Insertion of new slides  
Prepare an organization chart and create a slide show presentation for an invitation. Enter the text in slide view and rotate the object to 45 and also apply the text attributes
- 3. Presentation using wizards  
Usage of design templates
  - a) Creation of a slide show presentation to display percentage of marks in each semester for all students
  - b) Use Bar Chart (X-axis : Semester, Y axis : % of marks)
  - c) Using different presentation template and different transition effect for each slide. Use different text attributes in each slide.

## **MS ACCESS**

- 1. Create an ACCESS database contains student information like student name, rollno, marks secured in the various subjects for student marklist preparation.

## OBJECT ORIENTED SYSTEM DESIGN

Semester: III  
Code: U15CS303

Total Hrs. : 90  
Credits : 5

### Objectives

On completion of the course, the students will

1. comprehend the basic concepts of Java
2. know the OOPS concepts through Java

### Unit 1: Data: Basics, Arrays and Methods

Data types, variables, constants and Operators – Console I/O using print(ln) and Scanner – Conditional statements – Looping statements – Arrays: Declaration, Accessing elements – for-each Statement – Defining and calling methods– Passing arrays as arguments to methods – Method overloading

### Unit 2: OOP: Classes, Objects and Constructors

OOP Paradigm – Creating a class, data members and member functions – Static data and methods – Array of objects – Objects as arguments to methods – Constructors – Parameterized constructor – Constructor overloading

### Unit 3: OOP: Inheritance, Interfaces and Exception handling

Math, Character and String classes – Inheritance – Calling base class constructor and data members – Overriding and polymorphism – Abstract classes – Interfaces – Exception handling: try-catch-finally statements

**Unit 4: Data structures:** Vectors and type specific vectors – Enumeration – StringTokenizer – Stack – Iterators – ArrayList – LinkedList – Hashtable and HashMap. **File Processing:** FileInputStream – FileOutputStream – DataInputStream – DataOutputStream – FileReader – FileWriter – PrintWriter – RandomAccessFile

**Unit 5: GUI Programming:** Introduction – Applet advantages and restrictions - Creating and running JApplet – Creating GUI components inside Applets - Applet input parameters – Images in JApplet - Playing audio clips

### Text Book:

1. K. Rajkumar, “Java Programming”, Pearson Education, 2013

### Reference Books:

1. E. Balagurusamy, “Programming with Java”, TMH publishers, 4<sup>th</sup> edition, 2005
2. Herbert Schildt, “Java Complete Reference”, TMH publishers, 2006

## OBJECT ORIENTED SYSTEM DESIGN LAB

Semester: III  
Code: U15CS3P3

Total Hrs. : 45  
Credits : 2

### Objectives

On completion of the course, the students will

1. be able to develop the OOPS based applications using Java
2. be able to design the GUI based applications in Java

### Part-I: Simple Applications

1. Read salaries (*double* values) of three employees and display the highest salary
2. Calculate the grade for a given mark of a student. Grade is A if mark  $\geq 80$ , B if mark in between 60 and 79, C if mark in between 40 and 59, F if mark less than 40)
3. Check an year leap or not
4. Print the multiplication table of order **NxN**
5. Generate the first **n** Prime numbers
6. Calculate Factorial of a given number
7. Create an array **temp** and read into this array 7 temperature values (in Celsius) of a city, representing the weather from Monday to Sunday and display which day was the hottest in that week

### Part-II: Advanced Applications

- 1) **Scientific Calculator:** Develop an application that performs the following operations.
  - Addition, subtraction, multiplication, division and reminder
  - $\sin(x)$ ,  $\cos(x)$ ,  $\tan(x)$
  - $\log(x)$ ,  $e^x$ ,  $2^x$**Note:** The application should repeatedly perform operations until a user quits the program, based on some condition (eg. operator == '#')
- 2) **Top Employee:** Develop an application that reads salaries of N employees in M departments and perform the following operations
  - Display the average salary of each employee
  - Display the top employee, the one whose average salary is the highest
- 3) **Students Mark List:** Create a class *Student* with *rollno*, *name* and 3 marks (say, *m1*, *m2*, *m3*). Create a *constructor* that assigns the values of *rollno*, *name* and 3 marks. Then, create a method **display()** that displays the *rollno*, *name* and 3 marks. Create another method **calculate\_result()** that prints the result as either "Pass" or "Fail". The student has passed all exams if he secures at least 40 marks in each subject. Create a public class *MarkList* that instantiates **N** student objects by reading *rollno*, *name* and marks and displays the details and result of those students.

- 4) **Brackets Matcher:** Develop an application that reads a sequence of characters, and determines whether its parentheses, braces, and curly braces are balanced. (Hint: for left delimiters, push onto Stack; for right delimiters, pop from Stack and check whether popped element matches right delimiter)
- 5) **Word Counter:** Develop an application to read the contents of a large text file and count the occurrences of each word (Hint: use StringTokenizer to parse the file and Hashtable/HashMap to store the words and their count, also use FileReader for reading the file contents)
- 6) **Smiley face Applet:** Create an applet that will display 3 smiley faces in three different colors

## DATABASE MANAGEMENT SYSTEMS

**Semester: IV**  
**Code: U15CS404**

**Total Hrs. : 90**  
**Credits : 5**

### Objectives

On completion of the course, the students will

1. understand the fundamentals of database
2. obtain knowledge on the relational database management system and query languages

**Unit 1:** Introduction: Characteristics of the Database approach – Data models, schemas and instances – DBMS architecture – Data independence – Database languages and interfaces – Database administrator.

**Unit 2:** Data Modelling using the Entity - Relationship (ER) model: Entity sets, attributes and keys - Relationships, Relationship types, roles and structural constraints - Weak Entity types.

**Unit 3:** The Relational model: Relational model concepts – Relational model constraints - The Relational Algebra – Relational calculus – Tuple Relational calculus, Domain Relational calculus - SQL.

**Unit 4: Relational Database Design:** First Normal Form – Pitfalls in Relational Database Design – Functional Dependencies – Decomposition – Desirable properties of Decomposition – Boyce Codd Normal Form – Third Normal Form – Fourth Normal Form – More Normal Forms – Overall Database design process

**Unit 5: Transactions:** Transaction Concept – Transaction state – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability.

**Concurrency Control:** Lock based protocols – Time stamp based protocols – Validation based protocols – Multiple Granularity – Multiversion Schemes – Deadlock Handling –

**Recovery Systems:** Failure Classification – Storage Structure – Recovery and Atomicity – Log based Recovery.

### Text Books

1. Elmasri and Navathe, "Fundamentals of Database Systems", Addison - Wesley, 5<sup>th</sup> edition, 2010 (For units I, II and III only).
2. A Silberschatz, HF Korth and S Sudarshan, "Databases system concepts", TMH, 3<sup>rd</sup> edition, 1997 (For unit IV & V only)

### Reference Books

1. C.J Date, "An Introduction to Database Systems", Addison-Wesley publication, 8<sup>th</sup> Edition, 2003.

## **DATABASE MANAGEMENT SYSTEMS LAB**

**Semester: IV**  
**Code: U15CS4P4**

**Total Hrs. : 45**  
**Credits : 2**

### **Objectives**

On completion of the course, the students will

1. know the database querying using Oracle
  2. know to implement the database concepts using SQL and PL/SQL
- 
1. Develop a SQL query to create, update and to insert data in databases
  2. Use select statement to perform
    - i. AND, OR, NOT Operators, WHERE clause.
    - ii. UNION, INTERSECTION, MINUS.
    - iii. Sorting and grouping.
  3. Construct Nested queries using SOL
    - i. Sub queries
    - ii. Join
  4. Implement the use of Built – in functions of SQL.
  5. Construct Indexes, Views and Query in views.
  6. Design and test Functions and Procedures using PL/SQL
  7. Implement the concept of Cursors using PL/SQL
  8. Design Triggers using PL/SQL
  9. Develop simple forms using queries.

## **DATABASE – DRIVEN WEB DESIGN**

**Semester: V**  
**Code: U15CS505**

**Total Hrs. : 75**  
**Credits : 5**

### **Objectives**

On completion of the course, the students will

1. understand the web design issues and techniques for creation of dynamic websites using PHP.
2. know the database connections with MySQL and validation of the websites

### **Unit 1: Introduction to PHP**

Dynamic content and the web: PHP and MySQL in web development-The components of a PHP application-Requesting data from a Web page. Exploring PHP-PHP decision making.

### **Unit 2: Functions and Object Oriented Programming**

Function:-calling functions-defining functions. OOP: Creating classes-Objects-Methods-Constructors-Variable scope-Inheritance-Static methods and variables-Variable references- XHTML.

### **Unit 3: Arrays and Practical PHP**

Arrays: Array fundamentals:-Associative array-Indexed array-Creating an array-Multidimensional arrays-Extracting variables from an array-Array functions in PHP. Practical PHP: String functions-Date and Time functions-File manipulation-Calling system Calls.

### **Unit 4: Accessing MYSQL using PHP**

Working with MYSQL: MYSQL Database-Managing the database-Using PhpMyAdmin-Structured Query Language. Getting PHP to talk to MYSQL: The process-Querying the database with PHP functions. Cookies -sessions.

### **Unit 5: Form Handling and validation**

Working with Forms: Building a Form-Templates. Validation and Error Handling: Validating User Input-Pattern matching-Redisplaying a Form after PHP Validation fails.

### **Text Book:**

1. Michele E. Davis and Jon A. Phillips, “Learning PHP & MySQL”, O’reilly Publishers, 2011.

### **References Book**

1. Robin Nixon, “Learning PHP, MySQL and JavaScript”, O’reilly Publishers, 2009.
2. K.Meena,R.Sivakumar and A.B.Karthick Anand Babu, “Web Programming Using PHP and MySQL”, Himalaya Publishing House 2012.



## PRINCIPLES OF OPERATING SYSTEMS

Semester: V  
Code: U15CS506

Total Hrs. : 75  
Credits : 5

### Objectives

On completion of the course, the students will

1. acquire knowledge on the concepts of Operating Systems.
2. know Memory Management, Processor Management, Device Management and Information Management

**Unit 1: Introduction to Operating System:** Software - Machine Hardware – Types of Operating System – Batch systems, multiprogrammed batch systems, Time sharing systems, Real time systems, Hybrid systems.

**Unit 2: Memory Management:** Single user contiguous scheme – Fixed partition, Dynamic partition – Relocatable Dynamic partition – paged memory allocation – Demand paging – Page replacement policies – First in first out – least recently used – Segmented memory allocation – Demand paged memory allocation – Virtual memory.

**Unit 3: Process management:** Job scheduling Vs process scheduling – process scheduler – Job and process status – Process scheduling policies – Process scheduling Algorithms – FIFO, Shortest Job Next, Priority Scheduling, shortest remaining time, Round Robin.

**Unit 4: Dead Lock:** Dead Lock – Seven cases of Dead Lock – Condition for Dead Lock – Avoidance – Recovery – Starvation. **Device Management:** Sequential access storage media – Direct Access Storage Devices – Optical Disk storage - Access Time Required

**Unit 5: File Management:** The File Manager – File Organization – Physical storage allocation – Access methods – Levels in a File management system – Access control verification module – Data compression.

### Text Book:

1. Ida M.Flynn/Ann clverMc Hoes, “Understanding Operating Systems”, International Student Edition (ISE), 6th Edition, 2008

### Reference Books

1. Deitel H.M., “An Introduction to Operating System”, Addison Wesley Publishing Co., 3<sup>rd</sup> Edition, 2009 .
2. Silberschatz A. Peterson J.L. Galvan P., “Operating System Concepts”, 6<sup>th</sup> Edition, Addison Wesley Publishing Co., 2010.

## DIGITAL COMPUTER ARCHITECTURE AND MICROPROCESSORS

**Semester: V**  
**Code: U15CS507**

**Total Hrs. : 75**  
**Credits : 5**

### Objectives

On completion of the course, the students will

1. have basic knowledge on the principles of digital fundamentals and computer architecture.
2. understand the architecture and functions of microprocessors.

**Unit 1:** Number System-Digital Logic Circuits : Digital computers – Logic Gates – Boolean Algebra – Map Simplification – Combinational Circuits – Flip-Flops – Sequential Circuits.

**Unit 2:** Central processing unit: General Register Organization – Stack organization – Instruction formats – Addressing Modes – Data Transfer and Manipulation – Program control.

**Unit 3:** Introduction – Evolution of Microprocessors – Processing architecture of Intel 8085 – Instruction set of Intel 8085 – Instruction and data formats – Addressing modes of 8085 – Status flags – Stack and subroutines

**Unit 4:** Assembly language programming: Simple examples – Addition and Subtraction of Binary and Decimal numbers – Complements – Shift – Masking – Finding max and min number in an array – Arranging a series of numbers – Multiplication and Division – Multibyte addition and subtraction.

**Unit 5:** Peripheral devices and interfacing – Address space partitioning – Memory and I/O interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing Devices and I/O Devices – I/O Ports – Programmable DMA Controller.

### Text Books

1. M. Morris Mano, "Computer System Architecture", Pearson Education, 3<sup>rd</sup> Edition, 4<sup>th</sup> Indian Reprint, 2004. (For units 1 & 2).
2. Badri Ram, "Fundamentals of Microprocessors and Microcomputers", 5<sup>th</sup> revised and enlarged edition – Dhanpat Rai Publications – Reprint 2003. (For units 3, 4 & 5).

### Reference Books

1. Donald P. Leach and Albert Paul Malvino, "Digital Principles and Applications, 5<sup>th</sup> Edition, Tata McGraw – Hill Publishing Company Ltd, New Delhi, 10<sup>th</sup> Reprint, 2005.
2. Sunil Mathur, "Microprocessor 8085 and its Interfacing", Prentice Hall of India, 2010

## DATABASE – DRIVEN WEB DESIGN LAB

**Semester: V**  
**Code: U15CS5P5**

**Total Hrs. : 90**  
**Credits : 4**

### Objectives:

On completion of the course, the students will

1. be able to develop the simple programs in PHP.
  2. be able to design the Database driven websites using PHP and MySQL
- 
- 1) Write a PHP function to reverse an integer and a string and test these functions.
  - 2) Develop a PHP program for Palindrome.
  - 3) Implement a PHP program for Fibonacci series. Also find nth number in the series.
  - 4) Design a PHP program to maintain student records using files.
  - 5) Construct a PHP program to test internet tools for sending emails and accessing the content of a webpage.
  - 6) Design a PHP program to demonstrate required field validations to validate that all input fields are required.
  - 7) Prepare a form for your college library entering student details for each student in the college. Validate the form using PHP validators and display error messages
  - 8) Create a PHP program using Looping and Control Structures.
  - 9) Construct a PHP program to demonstrate constructors and destructors.
  - 10) Build a PHP program for cookies and sessions.
  - 11) Design a PHP program using forms to display Employee records stored in MySQL.
  - 12) Develop a student Registration in PHP and Save and Display the student Records using MySQL.
  - 13) Write a program to read customer information like c\_no, c\_name, item\_purchased and mob\_no from customer table and display all this information in table format on output screen
  - 14) Design and test a PHP code to upload image
  - 15) Construct a program that keeps track of how many times a visitor has loaded the page

## **ELECTIVE I - INTRODUCTION TO COMPUTER NETWORKS**

**Semester: V**  
**Code: U15CS5:1**

**Total Hrs. : 75**  
**Credits : 5**

### **Objectives**

On completion of the course, the students will

1. have the knowledge on the data communications and networks.
2. understand the communication protocols and its applications.

**UNIT 1:** Data Communication – Networks – Protocols and standard – Line configuration Topology – Transmission mode – Categories of networks – Internet works.

**UNIT 2:** The OSI model – Functions of the layers – TCP/IP protocol suite: Signals, Analog and Digital Signal – Periodic and periodic signals – Analog signals – Digital signals – Data transmission – Data Terminal equipment – Data circuit terminals equipment – Modems.

**UNIT 3:** Transmission media: Guided media – Unguided media – Transmission Impairment – Media comparison. Multiplexing: FDM-TDM-WDM. Error detection and correction: Types of errors – Detection – Vertical Redundancy check (VRC) – Longitudinal Redundancy check (LRC) – Cyclic Redundancy check (CRC) - Check sum-Error correction.

**UNIT 4:** Switching: Circuit switching – Packet switching – Message switching. Networking and Internetworking devices: Repeaters – Bridges – Routers-Gateways - Routing algorithms – Distance Vector Routing – Link State Routing – Data Link Control – Line Discipline – Flow Control.

**UNIT 5:** TCP/IP protocol suite: Client server model – Domain Name System – File Transfer Protocol (FTP) – Simple Mail Transfer Protocols (SMTP) – World Wide Web (www) – Hyper Text Transfer Protocol (HTTP).

### **Text Book**

1. Behrouz A. Forouzan, "Data Communications and Networks", 4th edition, Tata McGraw Hill Edition, 2007.

### **Reference Book**

1. Andrew S. Tanenbaum, "Computer networks", Pearson Publicaiton, 5<sup>th</sup> edition, 2012.

## **ELECTIVE I - INTERNET OF THINGS**

**Semester: V**  
**Code: U16CS5:2**

**Total Hrs. : 75**  
**Credits : 5**

### **Objectives:**

On completion of the course, the students will

1. understand the basics of Internet of Things(IoT).
2. elucidate the applications of Devices in IoT Technology.

**UNIT 1:** M2M to IoT: The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics

**UNIT 2:** M2M to IoT – A Market Perspective: Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview: Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

**UNIT 3:** M2M and IoT Technology Fundamentals: Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management . IoT Architecture-State of the Art: Introduction, State of the art. Architecture Reference Model: Introduction, Reference Model and architecture, IoT reference Model

**UNIT 4:** IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints: Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

**UNIT 5:** Industrial Automation: Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things. Commercial Building Automation: Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

### **Textbook**

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

### **Reference Book**

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014

## **ELECTIVE I - CLOUD COMPUTING**

**Semester: V**  
**Code: U16CS5:3**

**Total Hrs. : 75**  
**Credits : 5**

### **Objectives**

On completion of the course, the students will

1. know the fundamentals of Cloud Computing and its Architectures.
2. understand the services and applications of Cloud Computing.

**Unit 1:** Beyond the Desktop: Introduction to the Cloud Computing - Are you ready for computing the Cloud? -Developing Cloud Services.

**Unit 2:** Cloud Computing for Everyone- Cloud Computing for the Family- Cloud Computing for the Community- Cloud Computing for the Corporation.

**Unit 3:** Using cloud Services: Collaborating on Calendars, Schedules, and Task Management - Collaborating on Event Management -Collaborating on Contact Management -Collaborating on Project Management

**Unit 4:** Using cloud Services: Collaborating on Word -Collaborating on Spreadsheets-Collaborating on Presentations: Preparing Presentations Online-Evaluating Web-Based Presentation Applications

**Unit 5:** Using cloud Services: Collaborating on Databases- Storing and Sharing files and other online content: Understanding Cloud storage- Evaluating Online File Storage and Sharing Services.

### **Text Book**

1. Michael Miller, "Cloud Computing", Pearson Education Inc, 7<sup>th</sup> Edition, 2012

### **References Book**

1. Rajkumar Buyya & Co., "Cloud Computing Principles and Paradigms", John Wiley & Sons Publications, 2011.

## **SBEC – II IMAGE EDITING TOOLS**

**Semester: V**  
**Code: U15CSPS2**

**Total Hrs. : 30**  
**Credits : 2**

### **Objectives:**

On completion the course, the students will

1. know the different tools of Photoshop.
  2. be able to design the creative applications in Photoshop
- 
1. Prepare a Visiting Card containing atleast one graphic and text information.
  2. Create a Cover Page for the book in your subject area. Plan your own design by means of some text effects.
  3. Design a CD Cover Page and organize it on a Background, Brightness, Contrast, Rotating and Scaling Effects.
  4. Prepare a Booklet for a Seminar and apply the concept of feather effects.
  5. Procedure to design an Advertisement for a Job vacancy. Use the method of drop shadow effects.
  6. Design an Award certificate and organize with text and image tools.
  7. Prepare a Front page for a daily News Paper with necessary text and images.
  8. Design an invitation for Annual Sports Meet with creative colors and text.
  9. Create a logo for your college with different layers for text and images.

### SBEC III - TECHNICAL COMMUNICATION FOR COMPUTER SCIENTISTS

Semester: V  
Code: U15CSPS3

Total Hrs. : 30  
Credits : 2

#### Objectives:

On completion of the course, the students will

1. be able to develop the communication, inter personal skills and problem solving skills.
2. acquire professional skills with idealistic, practical and moral values.
1. **Oral communication:** Starting and ending a conversation, telling and asking people to do things- expressing opinions and ideas- decisions and intentions- offers and invitations- feelings- right and wrong- numbers and money
2. Purpose and audience- dealing with customers and clients- face to face discussions- meetings and attending meetings- checking understanding- raising questions- giving and receiving feedback- using body language- leading and directing discussions- concluding discussions, using graphics in oral presentation
3. Reading comprehension and reference skills: Skimming and scanning, factual and inferential comprehension- prediction- guessing meaning of words from context- word reference- comprehending graphics in technical writing
4. Reading strategies- reading speed, reading between lines for hidden meaning- interpreting graphics- using a dictionary- using an index- using a contents list to find information- choosing the right reference source
5. **Written Communication:** Note making and note taking- summarizing- notes and memos- developing notes into text- organization of ideas- cohesion and coherence- paragraph writing- ordering information in space and time- short essays- description and argument- comparison and contrast- illustration- using graphics in writing- tables and charts- diagram and flow charts- maps, plans and graphs.
6. Spelling rules and tips- writing a rough draft- editing and proof reading- writing the final draft- styling text- filling in complex forms- standard letters- CV- writing a report- writing leaflets and brochures- writing references- essay writing- expository writing- description of processes and products- classification- the instructional process- arguments and presentation of arguments- narrating events chronologically.



## FUNDAMENTALS OF SOFTWARE ENGINEERING

**Semester: VI**  
**Code: U15CS608**

**Total Hrs. : 90**  
**Credits : 5**

### Objectives

On completion of the course, the students will

1. understand the various phases of software development and software Engineering tools
2. know various software testing and strategies

**Unit 1:** Introduction to software engineering: Definitions – size factors – quality and productivity factors. Planning a software project: Defining the problem – developing a solution strategy – phased life cycle model – cost model – prototype model.

**Unit 2:** Planning an organizational structure: Project structure – programming team structure. Software requirements: Software requirement specification – formal specification techniques – structured analysis and design techniques.

**Unit 3:** Software design: Fundamental design concepts – modules and modularization criteria – design notations: DFD – structured charts – HIPO diagrams – decision tables. Design techniques: Stepwise refinement – levels of abstraction – structured design – integrated top-down development.

**Unit 4:** Software coding and testing: Coding standards and guidelines – code review – testing – unit testing – black box testing – white box testing – debugging – integration testing – system testing – general issues in testing. Software maintenance: Types of software maintenance – special problems associated with software maintenance – software reverse engineering – software maintenance process models – estimation of maintenance cost.

**Unit 5:** Computer aided software engineering: CASE environment – CASE support in software life cycle – characteristics of CASE tools – architecture of CASE environment – emerging trends.

### Text books

1. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill Publication, 21<sup>st</sup> reprint, 2005.
2. Rajib Mall, "Fundamentals of Software Engineering", PHI Learning Pvt. Ltd, 3<sup>rd</sup> edition, 2009.

### Reference book

1. Rojer S. Pressman, "Software Engineering", Tata McGraw Hill Publication, 7<sup>th</sup> edition, 2010

## **ELECTIVE – II FUNDAMENTALS OF COMPUTER GRAPHICS**

**Semester: VI**  
**Code: U15CS6:1**

**Total Hrs. : 90**  
**Credits : 5**

### **Objectives**

On completion of the course, the students will

1. know the fundamental principles of computer graphics
2. understand the computer graphics techniques

**UNIT 1:** Introduction to computer graphics – Image representation – Display Monitor – Printer – Image files – Setting the color attributes – Scan conversion – Line Drawing Algorithms – Circle Generation Algorithms.

**UNIT 2:** Region filling – Area filling algorithm – Scan converting a character – Anti aliasing – Recursively defined drawings – Two Dimensional Transformations – Geometric Transformations – Coordinate Transformations – Composite Transformation – Instance Transformations.

**UNIT 3:** 2D viewing and clipping: Window to viewport mapping – Point Clipping – Line Clipping – Cohen Sutherland Algorithm – Midpoint subdivision – Liang Barsky Algorithm – Polygon Clipping – Sutherland Hodgman Algorithm – The Weiler Artherton Algorithm – 2D Graphics pipeline with example.

**UNIT 4:** 3D Transformations: Geometric Transformations – Coordinate Transformations – Composite Transformation – Instance Transformations – Hidden surfaces – Depth comparisons Z-Buffer Algorithms – Back – Face Removal – The painter's Algorithm – Scan Line Algorithm – Subdivision Algorithm.

**UNIT 5:** Mathematics of Projections: Taxonomy of projections – Perspective and Parallel Projections – 3D viewing – Viewing Transformations – 3D Graphics Pipeline.

### **Text Book**

1. Zhigang Xiang & Roy Plastock, "Schaum's outline of Computer Graphics", McGraw Hill Publication, 2<sup>nd</sup> edition, 2001.

### **Reference Books**

1. Donald Hearn & M. Pauline Baker, "Computer Graphics", Pearson Education, 3<sup>rd</sup> Edition, 2003.
2. William M. Newman and Robert F. Sproull, "Principles of Interactive Computer Graphics", Mc Graw Hill Publication, 2<sup>nd</sup> edition, 1979.

## **ELECTIVE II - MULTIMEDIA AND APPLICATIONS**

**Semester: VI**  
**Code: U15CS6:2**

**Total Hrs. : 90**  
**Credits : 5**

### **Objectives:**

On completion of the course, the students will

1. learn different Multimedia architecture
2. know the Multimedia applications in various domains

**Unit 1:** Introduction: Objectives – History of Multimedia – Its market – Content copyright – Resources for multimedia developers – Types of products – Evaluation – Hardware Architecture – OS and Software – Multimedia Architecture – Software library – Drivers.

**Unit 2:** Text and Graphics : Elements of Text – Text Data files – Using text in Multimedia Application – Hypertext – Elements of Graphics – Images and color – Graphics files and Application formats – Creating images for multimedia use –Using graphics in Application.

**Unit 3:** Digital Audio and Video : Characteristics of sound and Digital audio – Digital Audio systems – MIDI – Audio file formats – Using Audio in Multimedia Applications – Audio for content – Background as video – Characteristics of digital video – Digital video data sizing Video capture and playback systems –Computer animation.

**Unit 4:** Product design and Authoring tools: Building blocks – Classes of products – Content organizational strategies – Story boarding – Multimedia tool selection – Tool feature – Categories of Authoring tools – Selecting the right authoring paradigm.

**Unit 5:** Multimedia and Internet: Internet – HTML and web authoring – Multimedia considerations for Internet – Design considerations for web pages.

### **Text book**

1. David Hillman, "Multimedia Technology and Applications", Galgotia Publications Pvt. Ltd., 1<sup>st</sup> edition, 2008.

### **Reference book**

1. Tay Vaughan, "Multimedia: Making it Work", Tata McGraw Hill Publication, 8<sup>th</sup> edition, 2011.

## ELECTIVE II - XML BASICS

Semester: VI  
Code: U15CS6:3

Total Hrs. : 90  
Credits : 5

### Objectives

On completion of the course, the students will be able to

1. elucidate the concepts of Markup languages for Web Design
2. understand the XML basics, Style sheets, and XML's significance in web documents

**Unit 1: Creating XML Documents:** Welcome to XML-All about XML-Working with XML-data yourself-Structuring your data-Creating well-formed XML documents-Creating valid XML documents. **Creating XML Documents:** Choosing XML editor-Using XML browsers-Using XML validators-creating XML documents piece by piece-Creating XML documents, XML comments, processing instructions, tags and elements, CDATA sections and Handling entities. **Creating well-formed XML Documents:** Understanding well formed ness Constraints-Using XML namespaces.

**Unit 2: Creating Valid XML Documents DTD's:** Validating a document by using a DTD-Creating element content models-Commenting a DTD-Supporting XML dtd's-Handling namespace in DTD's. **Handling attributes and Entities in DTDs:** Declaring attributes in DTD's-Specifying default values-Specifying attribute types-Handling Entities. **Creating valid XML documents: XML Schemas**-Creating XML schemas-Creating elements and types-Specifying number of elements-Element default values-Creating attributes.

**Unit 3: Creating types in XML schemas:**-Creating XML schema Choices-Using anonymous type definition-Declaring empty elements-Mixed content element-Grouping element together-attributes together-Declaring all groups-Handling namespace in schemas. **Formatting XML by using Cascading Style Sheet:** Introducing CSS-Connecting CSS style sheet and XML documents-Creating Style sheet selectors-Using inline styles-Creating Rule specification in style sheets.

**Unit 4: Formatting XML by using XSLT:** Introducing XSLT-Transforming XML by using XSLT-Writing XSLT stylesheet-Matching nodes by using match attributes- Working with the select attributes and XPath-using <xsl:copy>-<xsl:if>-<xsl:choose>. **Handling XLinks,XPointers and XForms:** Introducing XLinks-Beyond simple XLinks-Introducing XPointers-Introducing XBase,XForms-Creating Input Controls

**Unit 5: Using Javascript and XML:** Introducing the W3C DOM-Introducing DOM Objects-Working with XMLDOM in Javascript-Searching for elements by name-Reading attribute values. **Using java and .Net DOM:** Using java to read XML data-Finding element by name- Writing XML using DOM. **Using Java and .NET SAX:** Using SAX-Using SAX to find elements by name-Writing XML by using Java and SAX.

### Text Book

1. Steven Holzner, "XML in 21 days", Pearson Education ,Third Edition, 1<sup>st</sup> Indian Reprint, 2004

### Reference Book

1. Elliotte Rusty Harold, "XML Bible", John Wiley & Sons, 1<sup>st</sup> Edition, 2000.

## ELECTIVE III - WEB APPLICATIONS DEVELOPMENT

Semester: VI  
Code: U15CS6:4

Total Hrs. : 90  
Credits : 5

### Objectives

On completion of the course, the students will

1. have knowledge on Front end applications using VB.Net
2. know web applications using ASP.Net

**Unit 1:** Evolution of the .Net framework – Overview of the .NET framework – DLL, COM and Assemblies – VB.Net language – IDE main window – Value data type – Reference data type – Arithmetic operators.

**Unit 2:** IF-statement – Select-case statement – While statement – do statement – For statement – Methods and arrays – Class – Constructor overloading – Copy constructor – Instance class.

**Unit 3:** Inheritance – Abstract class and abstract method – Interface: Multiple Interface, Inheritance – Namespace – Access modifiers – Exception handling – Multithreading.

**Unit 4:** Text box control – Label control – Button Control – Radio button – Check box control – Group box control – List box control – Combo box – Timer control – Link Label – Dialog box – Tool bar control – Status bar control.

**Unit 5:** Basic Web Control: Introduction – ASP.Net Object Model – Server-side Control – Calendar Control – AdRotator Control – Validation Control – User Control.

### Text book

1. C. Muthu, “*Visual Basic.Net*”, Vijay Nicole Imprint Private Limited, 2007.

### Reference Books

1. Radhaganesan, “VB.Net”, Scitech Publications Pvt., Ltd., 2004.
2. Kris Jamsa, “Visual Basic.Net: Tips & Techniques”, Tata-McGrawHill Publication, 2002.

## ELECTIVE III - FOUNDATIONS OF ENTERPRISE COMPUTING

Semester: VI  
Code: U15CS6:5

Total Hrs. : 90  
Credits : 5

### Objectives

On completion of the course, the students will

1. have programming knowledge in J2EE.
2. be able to design websites using J2EE.

**Unit 1:** J2EE and J2SE-J2EE Multi-Tier Architecture: Distributive Systems-The Tier-J2EE Multi-Tier Architecture-Client Tier Implementation-Web Tier Implementation-Enterprise JavaBeans Tier Implementation-Enterprise Information Systems Tier Implementation-Challenges. J2EE Best Practices: Enterprise Application Strategy-The Enterprise Application-Clients-Sessions Management-Web Tier and JavaServer Pages.

**Unit 2:** Enterprise JavaBeans Tier-The Myth of using Inheritance-Maintainable Classes-Performance Enhancements-The Power of Interfaces-The Power of Threads-The Power of Notification. J2EE Design Patterns and Frameworks: The Pattern Concept-Pattern Catalog.

**Unit 3:** J2EE Database Concepts: Data-Database-Database Schema-The Art of Indexing. JDBC Objects: The Concept of JDBC-JDBC Driver Types-JDBC Packages-A Brief Overview of the JDBC process-Database Connection-Associating the JDBC/ODBC Bridge with the Database-Statement Objects-ResultSet-Transaction Processing-Metadata.

**Unit 4:** Java Servlets: Java Servlets and Common Gateway Interface programming-A Simple Java Servlet-Anatomy of a Java Servlet. Java Server Pages: JSP-JSP Tags-Tomcat-Request String-User Sessions-Cookies-Session Objects.

**Unit 5:**Enterprise JavaBeans: Enterprise JavaBeans-Deployment Descriptors-Session Java Bean-Entity Java Bean-Message Driven Bean-The JAR File.

### Text Book

1. Jim Keogh, *"J2EE: The Complete Reference"*, Tata McGraw Hill Publishing Company, New Delhi 2002

### Reference Books

1. Justin Couch and Daniel H. Steinberg, *"J2EE Bible"*, Willey India Pvt. Ltd, New Delhi, 2002
2. Paul Tremblett, *"Instant Enterprise Java Beans"*, Tata McGraw Hill Publishing Company, New Delhi, 2001

## ELECTIVE III - MOBILE APPLICATION DEVELOPMENT

Semester: VI  
Code: U16CS6:6

Total Hrs. : 90  
Credits : 5

### Objectives

On completion of the course, the students will

1. have knowledge on the basics involved in Application development in mobile platforms like Android, and developing User Interface using Android tools.
2. be able to develop the mobile applications using Android

**UNIT 1: Developing Spectacular Android Applications:** Why Develop for Android? - Android Programming Basics – Hardware Tools – Software Tools.

**Prepping Your Development Headquarters:** Assembling Your Toolkit – Installing and Configuring Your Support Tools – Getting Acquainted with the Android Development Tools.

**UNIT 2: Your First Android Project:** Starting a New Project in Eclipse – Deconstructing Your Project – Setting up an Emulator – Creating Launch Configurations – Running the Hello Android App – Understanding the Project Structure.

**Designing the User Interface:** Creating the Silent Mode Toggle Application – Laying Out the Application – Developing the User Interface – Adding an Image to Your Application – Creating a Launcher Icon for the Application – Adding a Toggle Button Widget – Previewing the Application in the Visual Designer.

**UNIT 3: Coding Your Application:** Understanding Activities – Creating Your First Activity – Working with the Android Framework Classes – Installing Your Application – Reinstalling Your Application – Responding to Errors. Understanding Android Resources: Understanding Resources – Working with Resources.

**UNIT 4: Handling User Input:** Creating the User Input Interface – Getting Choosy with Dates and Times – Creating Your First Alert Dialog Box – Validating Input.

**UNIT 5: Getting Persistent with Data Storage:** Finding Places to Put Data – Asking the User for Permission – Creating Your Application's SQLite Database. Creating and Editing Tasks with SQLite: Inserting, Deleting and Updating a task.

### Text Book

1. Donn Felker and Joshua Dobbs, "Android Application Development – for Dummies", Wiley Publishing Inc., 1<sup>st</sup> edition, 2011.

### Reference Book

1. Jerome (J.F.) DiMarzio, "Android – A Programmer's Guide", Tata McGraw-Hill Publication, 2010.

## PROJECT

**Semester** : VI  
**CODE** : U15CS6PJ

**Total.hrs.** : 90  
**Credits** : 5

### Objectives

On completion of the course, the students will

1. be able to apply the knowledge gained through various courses in solving a real life problem
2. be able to practice different phases of software/system development life cycle
3. be able to get accustomed to professional environment and/or style typical of a global IT industry
4. be able to be a part of structured team work and project management
5. be able to get an opportunity for effective, real-life, technical documentation
6. be able to practice time, resource and person management.

### Project Evaluation

- **Internal Assessment**

There shall be six components that will be considered in assessing a project work with weightage as indicated.

- Timely completion of assigned tasks as evidenced by team meeting minutes
- Individual involvement, team work and adoption of industry work culture
- Quality of project documentation (Precision, stylistics etc)
- Achievement of project deliverables
- Effective technical presentation of project work
- Viva
- Based on the above 6 components internal mark can be awarded

- **External Assessment**

Dissertation/Project submitted at the end of third year shall be valued by two examiners appointed by the Controller for the conduct of practical exam. The board of examiners shall award 60 marks based on the following components.

- Achievement of project deliverables
- Effective technical presentation of project work
- Project Viva



**Allied Computer Science Courses offered to students of  
Under Graduate Programme in Mathematics**

(For the candidates admitted from the year 2016 onwards)

Sem.	Course	Code	Title	Hrs./ week	Credits	Marks		
						CIA	ESA	Total
I	I	U16CSY11	Fundamentals of C Programming	4	4	25	75	100
II	II	U16CSY22	Object Oriented Programming with JAVA	4	4	25	75	100
I&II	III	U16CSYP1	Allied Computer Science Practicals	6	4	40	60	100

## Allied Course I – Fundamentals of C Programming

Sem. I  
Total Hrs. 60

Code : U16CSY11  
Credits : 4

### General objective:

To gain knowledge on computer and the fundamental concepts of C Programming.

### Unit I

**Introduction to Computers:** The Computer System- Applications of Computers. **Computer Program:** Algorithm-Flowchart –Characteristics of Good Program. **Overview of C:** History of C-Importance of C-Basic Structure of C Programs-Executing a C program. **Constants, Variables, and Data types:** Character Set- C Tokens-Keywords and Identifiers-Constants-Variables-Data Types – Declaration of Variables – Assigning Values to Variables-Declaring Variable as Constant.

### Unit II

**Managing Input and Output Operations:** Reading a Character-Writing a Character-Formatted Input-Formatted Output. **Operators and Expressions:** Arithmetic Operators-Relational Operators-Logical Operators- Assignment Operators-Increment and Decrement Operator- Conditional Operator-Bitwise Operator-Arithmetic Expression-Evaluation of Expression-Precedence of Expressions.

### Unit III

**Decision Making and Branching:** Simple if Statement-The if...else Statement-Nesting of if ....else Statement-The Else if Ladder-Switch Statement-The?: Operator-The goto Statement. **Decision Making and Looping:** The while Statement-The do Statement-The for Statement-Jumps in loops. **Arrays:** One dimensional Array-Declaration and Initialization of One Dimensional Arrays- Two dimensional Arrays-Initializing Two-dimensional Arrays-Multi-dimensional Arrays.

### Unit IV

**User Defined Function:** Need for User Defined Functions-Elements of User Defined Functions-Definition of Functions-return Values and their types-Category of Functions- No Arguments and no return Values-Argument but no return Values- Arguments with Return values-No arguments but returns a value-Recursion. **Pointers:** Understanding pointers-Declaring pointer variable-Initialization of pointer variable-Accessing a variable through its pointer-Pointers and Arrays.

### Unit V

**Structures and Unions:** Defining a Structure-Declaring Structure Variables-Accessing Structure Members-Structure Initialization-Copying and Comparing Structure Variables-Arrays of Structures-Array within Structures-Structures within Structures-Structures and Functions-Unions. **Strings:** String Handling Functions. **File Management in C:** Introduction-Defining and Opening a File-Closing a File-Input/Output Operations on File-Random Access to Files

**Text Books:**

1. ***“Introduction to Computer Science”***-ITL Education Solutions Ltd., Pearson Education, Fourth Impression, 2009.
2. ***“Programming in ANSI C”***-E. Balagurusamy, Tata McGraw-Hill Publishing Company Ltd Sixth Edition, 2012.

**Reference Books:**

1. ***“Fundamentals of Information Technology”***, Alexis Leon & Mathews Leon, Vikas Publishing House Private Limited, 2<sup>nd</sup> Edition, 2009.
2. ***“Programming with ANSI and TURBO C”***, – Pearson Education – Ashok N. Kanthane 2<sup>nd</sup> Edition, 2011.

## **Allied Course II – Object Oriented Programming with JAVA**

**Sem. II**  
**Total Hrs. 60**

**Code : U16CSY22**  
**Credits : 4**

### **General objective:**

To gain basic knowledge of object oriented programming paradigm using JAVA.

### **UNIT I:**

Introduction to OOPs – Introduction to operators and expression in JAVA – working with Decision making statements in JAVA – working with Array in JAVA

### **UNIT II:**

Functions in JAVA – Classes and Objects – Inheritance in JAVA – Packages and Interfaces - Exception handling.

### **UNIT III:**

Streams and Files – Applet and Graphics Programming: Applet class – Applet Tag and Applet Parameters – Passing Parameters to Applet – working with Graphics Class.

### **UNIT IV:**

Event Handling: Introduction – The Event Classes – Event Listeners – Discussion of Event Classes – The Listeners Interfaces – Programming Examples.

### **UNIT V:**

Working with AWT: AWT Window Hierarchy- AWT Controls. Working with Layout : Layout and Layout Managers – Flow Layout – Border Layout – Grid Layout.

### **Text Book:**

1. “JAVA Programming”, Hari Mohan Pandey, First Edition, Pearson Education, 2012.

### **References:**

1. “JAVA Programming”, K.Rajkumar, First Edition, Pearson Education, 2013.
2. “JAVA The Complete Reference Eighth Edition”, Herbert Schildt, Oracle Press, 2011.

## **Allied Course III - Allied Computer Science Practicals**

**Sem. I&II**  
**Total Hrs. 90**

**Code : U16CSYP1**  
**Credits : 4**

### **General objective:**

To acquire training in developing codes using C and JAVA

### **List of Practicals**

1. C Program to find the largest number using if...else statement.
2. C Program to find the roots of a Quadratic Equation.
3. C Program to find the areas of geometrical Shapes such as Rectangle, Square, Circle and Triangle.
4. C Program to sort the element in the array in an Ascending order.
5. C Program to check a string is a Palindrome.
6. C Program to find NPR and NCR
7. C Program to generate Fibonacci Series for the given number of n terms
8. C program to find the Armstrong number between 100 and 999
9. C Program to find the Factorial of a number
10. C program to find Matrix Subraction and Multiplication
11. C Program to generate Pascal Triangle
12. Java Program using Classes and Objects
13. Java Program to calculate Total and Average for Student marks using Inheritance
14. Java Program using Method Overriding
15. Java Program using Try and Catch in Exception Handling
16. Java Program using Interface
17. Java Program to Delete a file
18. Java Program to demonstrate the Life Cycle of an Applet
19. Java Program to pass parameter to an Applet
20. Java program to implement Mouse Event using Applet
21. Java Program using MouseListener Interface in an Applet
22. Java program to implement Key Listener using Applet
23. Java Program to arrange the components using BorderLayout in an Applet

**UG – Skill Based Courses (SBC)**

Sem.	Course	Code	Title	Hrs.	Credits	Marks		
						CIA	ESA	TOTAL
IV	SBC– I	U16LFS41	Life Skills	2	1	100	-	100

## LIFE SKILLS

**Semester IV**  
**Credit 1**

**Course code: U16LFS41**  
**Total Hrs : 30**

### **General objectives**

1. To acquire skills and abilities for adaptive and positive behavior that helps to deal effectively with the demands and challenges of everyday life.
2. To develop creative, communicative and critical thinking skills necessary for employability

### **Unit I Basics of Communication skills & Effective Communication**

Features of Communication – Process of Communication Verbal, nonverbal, Body Language – Postures & Etiquette – Listening & speaking Skills- Communication Barriers – Listening & speaking Skills.

### **Unit II Personal Effectiveness**

Maslow's theory – Self-esteem- Role Conflict – Intra & Inter personal Skills – Efficiency Vs effectiveness – Team Building – Emotional Intelligence & Quotient

### **Unit III Interview Skills**

Types of Interviews – Resume Formats & preparation - Cover letters – Simple rules to face interviews – Dos & Don'ts in an Interview – Telephonic Interview and Etiquette - Group Discussions – Types – Methods – Ingredients and Tips for a Successful Group Discussion.

### **Unit IV Test of Reasoning & Numerical Ability**

- A. Numerical Ability: Problems related to Average – Percentage – Profit /Loss – Simple & Compound Interest- Time & Work – Boats & Streams etc.
- B. Logical reasoning: Logical Detection – Nonverbal reasoning – Problems related to seating arrangements – Relationship model – Assertion & Reasoning etc.
- C. Online Tests: Aptitude – Logical Reasoning – Problem Solving – Time management in Online tests- Online tests on Language skills- Aptitude and technical rounds

### **Unit V Outbound Learning**

Physical, Mental, and emotional exercises

### **References**

1. Barun.K.Mitra, Personality Development and Soft Skills, 6<sup>th</sup> edition, Oxford University press Noida 2012.
2. M.Sarada, The complete Guide to Resume Writing, Sterling Publishers Pvt Ltd, New Delhi 2012.
3. Gloria J.Galances & Katherine Adams, Effective Group Discussions, Theory & practice, 12<sup>th</sup> Edition, Tata McGrawHill Pvt Ltd 2012.
4. Francis Soundararaj, Basics of Communication in English, SoftSkills for Listening Speaking, Reading & Writing, Macmillan Publishers India Ltd. 2013.

### **Scheme of Evaluation**

1.	EQ test	10 Marks
2.	Resume	10 Marks
3.	Numerical Ability Test	10 Marks
4.	Online test 1( aptitude)	10 Marks
5.	Group Discussion	10 Marks
6.	Team Work	10 Marks
7.	OBL Observation / Work book	40 Marks
<b>Total</b>		<b>100 Marks</b>



**UG - Non Major Elective Courses (NMEC)**  
**(Offered to Students of other Disciplines)**

Sem.	Course	Code	Title	Hrs./ week	Credits	Marks		
						CIA	ESA	TOTAL
III	NMEC- I	U15CS3E1	Basics Of Computer Programming	2	2	25	75	100
IV	NMEC- II	U15CS4E2	Fundamentals Of Information Technology	2	2	25	75	100

## NMEC I - BASICS OF COMPUTER PROGRAMMING

Semester: III  
Code: U15CS3E1

Total Hrs. : 30  
Credits : 2

### Objectives:

On completion of the course, the students will

1. know the basics of computers and programming techniques.
2. know the basic concepts of C Programming

**UNIT 1: Introduction to computer:** Introduction – Characteristics of computer – Generation of computers – Classification of computers – The computer system – Application of Computer. **Computer Architecture:** Introduction – Central Processing Unit – Memory

**UNIT 2: Computer Program:** Introduction – Developing a program – Algorithm – Flow chart. **Computer Languages:** Introduction – evolution of programming languages Classification of programming languages.

**UNIT 3: Computer Software:** Introduction – Software definition – Relationship between software and hardware – software categories – System Software – Application Software.

**UNIT 4: Introduction to C** – overview of computers and interpreters – structure of a C program – C Character set – C keyword – Constants – Variables – Data types – Types Conversion – Operators and Expressions.

**UNIT 5: Input and Output in C** – Decision statements: IF, ELSE – IF, BREAK, CONTINUE, GOTO and SWITCH. Loop Control statements: FOR, WHILE, DO-WHILE.

### Text Books:

1. Jennifer Sargunar, "Introduction to Computer Science", IITL Education Solution Limited, Pearson Education, 2<sup>nd</sup> edition, 2011
2. Ashok, N.Kamthane, "Programming with ANSI and TURBO C", Pearson Education, 3<sup>rd</sup> Indian print, 2003

### Reference Book:

1. Balagurusamy.E, "Programming in C", Tata McGraw Hill, 4<sup>th</sup> Edition, 2008.

## **NMEC II - FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**Semester: IV**  
**Code: U15CS4E2**

**Total Hrs. : 30**  
**Credits : 2**

### **Objectives:**

On completion of the course, the students will

1. comprehend the basics of computer
2. know the concepts of Internet and E-Commerce and their applications

### **UNIT 1**

Introduction to computers – Classification of computers – Central Processing Unit (CPU).

### **UNIT 2**

Computer Memory – Secondary storage devices: - Introduction – Classification of secondary storage devices – Advantages – Magnetic Disks – Optical Disk – Magnetic Tape. Input Devices and Technologies: - Introduction – Keyboard – Mouse – TrackBall-Game controllers – Scanners – Barcode Reader – OCR – Digitizer – Voice Recognition – Web Cams – Digital Cameras – Video Cameras (Camcorders).

### **UNIT 3**

Output devices and technologies: - Introduction – Monitor – Printer – Plotter. Computer Software :- Introduction – What is computer software?-Hardware/Software interaction – Software categories – Classification of software – Operating systems – Utilities Compilers and Interpreters – Word processors – Spread sheets – Presentation – Database Management Systems (DBMS)-Image processors.

### **UNIT 4**

Internet and www:- Introduction – Evolution of Internet – What can I do on the Internet? – Internet protocols – Internet addressing – The World Wide Web (www) – Web pages and HTML – Web browsers – Searching the web-Internet code of conduct.

### **UNIT 5**

E-Commerce – I: Introduction – Definition – Evolution – Types – Business-to-Business (B2B) E-Commerce Business-to-Consumer (B2C) E-Commerce Benefits of E Commerce for companies – Benefits of E-Commerce for customers. E-Commerce – II: E-Money Types of E-Money and E-Money Systems – Digital cash and E-Cash Credit Cards-Debit cards – Smart Cards – Benefits of E-Money – Credit Cards and Credit Card processing – Legal issues of E-Commerce – Ethical issues of E-Commerce.

**Text Book**

1. P.Rizwan Ahmed, “Introduction to Information Technology”, Margham Publications, 2014.

**Reference Books**

1. Jenifer Sargunar, “Introduction to Computer Science”, ITL Education Solutions Ltd., Pearson – 2nd Edition, 2013 (Units I,II,III,IV)
2. S.Jaiswal, “Doing Business on the Internet e-commerce”, Galgotia Publications Pvt., Ltd., 2010 (Unit V)