

**GITAM INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
(GITAM)  
(Deemed to be University, Estd. u/s 3 of UGC Act 1956)  
VISA KHAPATNAM \*HYDERABAD \*BENGALURU  
Accredited by NAAC with 'A' Grade**



**REGULATIONS AND SYLLABUS  
of  
Bachelor of Computer Applications  
(W.e.f 2015-16 admitted batch)**

**Website: [www.gitam.edu](http://www.gitam.edu)**

# **B.C.A (Bachelor of Computer Applications) REGULATIONS**

**(W.e.f. 2015-16 admitted batch)**

## **1. ADMISSION**

1.1 Admission into B.C.A. program of GITAM University is governed by GITAM University admission regulations.

## **2. ELIGIBILITY CRITERIA**

2.1. A pass in intermediate / +2 with a minimum aggregate of 50% marks in the qualifying examination.

2.2. Admission into B.C.A (Bachelor of Computer Applications) will be based on an All India GITAM Science Admission Test (GSAT) conducted by GITAM University and the rule of reservation, wherever applicable.

## **3. CHOICE BASED CREDIT SYSTEM**

Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:

- Student Centered Learning
- Cafeteria approach
- Inter-disciplinary learning

Learning goals/ objectives and outcomes are specified leading to what a student should be able to do at the end of the program.

## **4. STRUCTURE OF THE PROGRAM:**

4.1 The Program Consists of

- i) Foundation Courses (compulsory) which give general exposure to a Student in communication and subject related area.
- ii) Core Courses (compulsory).
- iii) Discipline centric electives which
  - a) are supportive to the discipline
  - b) give expanded scope of the subject
  - c) give inter disciplinary exposure
  - d) Nurture the student skills
- iv) Open electives are of general nature either related or unrelated to the discipline.
- v) Practical Proficiency Courses

Laboratory and Project work.

4.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

4.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.

- One credit for each Lecture / Tutorial hour per week.
- Two credits for three (or more) hours of Practicals per week.
- Eight credits for project.

4.4 The curriculum of the Six semesters B.C.A program is designed to have a total of 122 credits for the award of B.C.A degree.

## **5. MEDIUM OF INSTRUCTION**

The medium of instruction (including examinations and project reports) shall be English.

## **6. REGISTRATION**

Every student has to register himself/herself for each semester individually at the time specified by the Institute / University.

## **7. ATTENDANCE REQUIREMENTS**

7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend that end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his / her juniors.

7.2 However, the Vice Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

## **8. EVALUATION**

8.1 The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in continuous evaluation and semester end examination the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical / Viva voce etc. courses are completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.

**Table 1: Assessment Procedure**

S. No.	Component of assessment	Marks allotted	Type of Assessment	Scheme of Examination
1	Theory	40	Continuous evaluation	(i) Two mid semester examinations shall be conducted for 15 marks each. (ii) 5 marks are allocated for quiz. (iii) 5 marks are allocated for assignments.
		60	Semester-end examination	The semester-end examination Shall be for a maximum of 60 marks.
	Total	100		
2	Practicals	40	Continuous evaluation	Forty (40) marks for continuous evaluation is distributed among the components: regularity, preparation for the practical, performance, submission of records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the Semester.
		60	Continuous evaluation	Sixty (60) marks for two tests of 30 marks each (one at the mid-term and the other towards the end of the Semester) conducted by the concerned lab Teacher and another faculty member of the department who is not connected to the lab, as appointed by the HoD.
	Total	100		
3	Project work	200	Project evaluation	(i) 150 marks for evaluation of the project work dissertation submitted by the candidate. (ii) 50 marks are allocated for the project Viva-Voce. (iii) The project work evaluation and the Viva-Voce shall be conducted by one external examiner outside the University and the internal project work supervisor.

**9. RETOTALING & REAPPEARANCE**

9.1 Retotaling of the theory answer script of the end-semester examination is permitted on the request made by the student by paying the prescribed fee within fifteen days of the announcement of the result.

9.2 A student who has secured 'F' grade in a Theory course shall have to reappear at the subsequent semester end examinations held for that course.

9.2.1 A student who has secured 'F' grade in a Practical course shall have to attend Special Instruction Classes held during summer.

9.2.2 A student who has secured 'F' Grade in Project work / Industrial Training etc shall have to improve his/her report and reappear for Viva – voce at the time of Special Examination to be conducted in the summer vacation.

## 10. SPECIAL EXAMINATION

A student who has completed his / her period of study and still has "F" grade in a maximum of four Theory courses is eligible to appear for Special Examination normally held during summer vacation.

## 11. BETTERMENT OF GRADES

A student who has secured only a Pass or Second class and desires to improve his/her Class can appear for Betterment Examinations only in Theory courses of any Semester of his/her choice, conducted in Summer Vacation along with the Special Examinations. Betterment of Grades is permitted 'only once' immediately after completion of the program of study.

## 12. GRADING SYSTEM

12.1 Based on the student performance during a given semester/trimester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

**Table 2: Grades & Grade Points**

Sl.No.	Grade	Grade Points	Absolute Marks
1	O (outstanding)	10	90 and above
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+ (Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C (Average)	5	45 to 49
7	P (Pass)	4	40 to 44
8	F (Fail)	0	Less than 40
9	Ab. (Absent)	0	-

12.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course, subject to securing a GPA of 5 for a Pass in the semester/trimester.

## 13. GRADE POINT AVERAGE

13.1 A Grade Point Average (GPA) for the semester/trimester will be calculated according to the formula:

$$\text{GPA} = \frac{\sum [C * G]}{\sum C}$$

Where

C = number of credits for the course,

G = grade points obtained by the student in the course.

13.2 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken, in all the semesters up to the particular point of time.

13.3 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

**Table 3: CGPA required for award of Class**

<b>Class</b>	<b>CGPA Required</b>
First Class with Distinction	$\geq 8.0^*$
First Class	$\geq 6.5$
Second Class	$\geq 5.5$
Pass Class	$\geq 5.0$

\* In addition to the required CGPA of 8.0 or more the student must have necessarily passed all the courses of every semester in first attempt.

#### **14. ELIGIBILITY FOR AWARD OF THE B.C.A DEGREE**

14.1 Duration of the program: A student is ordinarily expected to complete B.C.A program in Six semesters of three years. However a student may complete the program in not more than Six years including study period.

14.2 However the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

14.3 A student shall be eligible for award of the B.C.A Degree if he / she fulfills all the following conditions.

- a) Registered and successfully completed all the courses and projects.
- b) Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
- c) Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and
- d) No disciplinary action is pending against him / her.

14.4 The degree shall be awarded after approval by the Academic Council.

#### **15. Discretionary Power:**

Notwithstanding anything contained in the above sections, the Vice Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

**Bachelor of Computer Applications (B.C.A.)**  
**Scheme of Instruction**  
**I SEMESTER**

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 101	Introduction to Information Technology	4	4	0	4	3	60	40
2	SCS 103	Introduction to C programming Language	4	4	0	4	3	60	40
3	SCS 105	Communication Skills-I	4	4	0	4	3	60	40
4	SCS 107	Mathematics-I	4	4	0	4	3	60	40
<b>PRACTICALS :</b>									
	SCS 121	Programming with C Lab	2	0	3	3	3	--	100
	SCS 123	Communication Skills-I Lab	2	0	3	3	3	--	100
		Total	20	16	6	22	--	240	360

**B.C.A. – II SEMESTER**

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 102	Internet Programming	4	4	0	4	3	60	40
2	SCS 104	Introduction to Object oriented Programming with C++	4	4	0	4	3	60	40
3	SCS 106	Communication Skills-II	4	4	0	4	3	60	40
4	SCS 108	Mathematics-II	4	4	0	4	3	60	40
5		Open Elective-I	3	3	0	3	3	60	40
<b>PRACTICALS :</b>									
	SCS 122	Programming with C++ Lab	2	0	3	3	3	--	100
	SCS 124	Internet Programming Lab	2	0	3	3	3	--	100
			23	19	6	25	--	300	400

### B.C.A. – III SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 201	Elementary Data Structures using C++	4	4	0	4	3	60	40
2	SCS 203	Introduction to UNIX programming	4	4	0	4	3	60	40
3	SCS 205	Introduction to Digital Logic Circuits	4	4	0	4	3	60	40
4	SCS 207	Introduction to Operating Systems	4	4	0	4	3	60	40
5		Open Elective-II	3	3	0	3	3	60	40
<b>PRACTICALS :</b>									
	SCS221	Data Structures Lab using C++	2	0	3	3	3	--	100
	SCS223	UNIX Programming Lab	2	0	3	3	3	--	100
		Total	23	19	6	25	--	300	400

### B.C.A. – IV SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS202	Introduction to Database management systems	4	4	0	4	3	60	40
2	SCS204	Data Communications	4	4	0	4	3	60	40
3	SCS206	Introduction to Java Programming	4	4	0	4	3	60	40
4	SCS208	Principles of Software Engineering	4	4	0	4	3	60	40
5	SCS242 SCS244 SCS246	<b>Generic Elective – I</b> Systems Programming Computer System Architecture Principles of Programming Languages	4	4	0	4	3	60	40
<b>PRACTICALS :</b>									
	SCS222	Data Base Management Systems Lab	2	0	3	3	3	--	100
	SCS224	Java Programming Lab	2	0	3	3	3	--	100
		Total	24	20	06	26	--	300	400



**B.C.A. – V SEMESTER**

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS301	Computer Networks	4	4	0	4	3	60	40
2	SCS303	Introduction to Cryptography	4	4	0	4	3	60	40
3	SCS305	Fundamentals of Cloud Computing	4	4	0	4	3	60	40
4	SCS307	Business Intelligence and Decision Support Systems	4	4	0	4	3	60	40
5	SCS341 SCS343 SCS345	Generic Elective – II Advanced Java Programming . Net Programming Financial Accounting and Analysis	4	4	0	4	3	60	40
<b>PRACTICALS :</b>									
	SCS321	Business Intelligence Lab	2	0	3	3	3	--	100
	SCS381 SCS383 SCS385	Generic Elective – II Lab Advanced Java Programming Lab . Net Programming Lab Financial Accounting and Analysis Lab	2	--	3	3	3	--	100
		<b>Total</b>	<b>24</b>	<b>20</b>	<b>06</b>	<b>26</b>	<b>--</b>	<b>300</b>	<b>400</b>

**B.C.A. – VI SEMESTER**

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS392	Project Work	8	0	--	--	--	50	150
		<b>Total</b>	<b>8</b>	<b>0</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>50</b>	<b>150</b>

**Total Credits : 20 + 23 + 23 + 24 + 24+ 8 = 122**

**BACHELOR OF COMPUTER APPLICATIONS  
I SEMESTER**

**SCS 101: INTRODUCTION TO INFORMATION TECHNOLOGY**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To enable the student to understand the concepts of Information Technology and its applications along with familiarization with the use of Information Technology tools.

**UNIT - I**

**Data and Information:** Introduction, Types of data, Simple model of a computer, Data processing using a computer, Desktop computer.

**Acquisition of Numbers and Textual Data:** Introduction, input units, internal representation of numeric data, Representation of characters in computers, Error Detecting codes.

**Processing and Displaying Textual Data:** Word processor, Desktop Publishing, Page Description language, Mark-up Languages. (10)

**UNIT - II**

**Data storage:** Introduction, Storage cell, Physical devices used as storage cells, Random access memory, Read only memory, Secondary storage, Compact disk read only memory (CDROM), Archival store.

**Central Processing Unit:** Introduction, Structure of a central processing unit, Specifications of a CPU, Interconnection of CPU with memory and I/O units, Embedded processors.

**Output Devices:** Video Display Devices, Touch Screen, Printers, Audio Output. (10)

**UNIT - III**

**Computer Networks:** Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming computers connected to Internet, Future of Internet Technology.

**Computer Software:** Introduction, Operating system, Programming languages, Classification of programming languages, Classification of Programming Languages based on applications.

**Processing Multimedia Data:** Graphics Processing, Audio Signal Processing

**Acquiring Audio Data - Basics of Audio Signals, Acquiring and storing Audio Signals, Compression of Audio Signals.**

**Acquisition of Video:** Computing a moving Scene with a video camera, Compression of Video Data, MPEG Compression standard. (10)

**UNIT - IV**

**Data organization:** Introduction, Organizing a database, Structure of a database, Database Management System, Example of database design, Non-text databases, Archiving databases.

**Processing Numerical Data:** Introduction, Use of spreadsheets, Numerical computation examples.

**Business Information Systems:** Introduction, Types of Information Needed by Organization. (10)

**UNIT - V**

**Some Internet Applications:** Introduction, Email, World Wide Web, Information Retrieval from the WWW - Browsers.

**E-Commerce:** Introduction, Business to customer E-commerce, Business to business E-commerce, Customer to customer E-commerce, Advantages and disadvantages of E-commerce, E-commerce system architecture, Digital signature, Payment schemes in E-commerce, Electronic clearing service in E-commerce, Cash transactions in E-commerce, Payment in C2C E-commerce, Electronic data

interchange, Intellectual property rights and E-commerce, Information technology act.

**Social Impacts of Information Technology:** Introduction, Social uses of www, Privacy, Security and integrity of information, Disaster recovery, Intellectual property rights, Careers in Information technology. (10)

**Text Books:**

1. Introduction To Information Technology by V. Rajaraman, PHI Learning Pvt.Ltd., 2013.

**Reference Books:**

1. Computing Fundamentals by Peter Norton, Tata Mc. Graw Hill, 6<sup>th</sup> edition, 2006.
2. Fundamentals of Computers by E.Balagurusamy, Tata MaGraw Hill, 2009.

## BCA – I SEMESTER

### SCS 103: INTRODUCTION TO C PROGRAMMING LANGUAGE

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To enable the student to understand the basic concept of C Programming Language.

#### UNIT - I

**Overview of C:** History of C, Importance of C, Basic structure of C programs. Constants, variables and data types, Character set, C Tokens, Keywords and identifiers, Constants, Variables, Declaration of storage classes, Assigning values to variables, Defining symbolic constants. Operators and expression, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity mathematical functions.

**Managing input and output operations:** Reading and writing a character, formatted input and output. (12)

#### UNIT - II

**Decision making and branching:** Simple IF, IF-ELSE, Nesting of IF, ELSE, ELSE-IF ladder, Switch statements, GOTO statements.

**Decision making and looping:** WHILE statement, DO statement, FOR statement, Jumps in loops.

**Arrays:** Definition & Declaration, One dimensional, Two dimensional, Multi dimensional arrays, Dynamic arrays. (10)

#### UNIT - III

**Character arrays and strings:** Introduction, Declaring and initializing string variables, Reading strings from terminal, writing strings to screen, String handling functions, Table of strings.

**User Defined functions:** Introduction, Need for user, Defined function, A Multifunction program, Elements of user defined function, Definition of functions, Return values and their types, Function calls, Function declaration, All category of functions, Nesting of functions, Recursion, Passing arrays to functions, Passing strings to function. (10)

#### UNIT - IV

**Structures and Unions:** Introduction, Defining a structure, Declaring structure variables, Accessing structure members, Structure initialization, Copying and comparing structure variables, Arrays of structures, Arrays within structures, Structures within structures, Structures and functions, Unions, Size of Structures, Bit Fields. (10)

#### UNIT - V

**Pointers:** Introduction, Understanding pointers, Accessing the address of a variable, Initializing of pointer variables. Chain of pointers, Pointer expressions, Pointers and arrays, Pointers and character strings, Arrays of pointers, Pointers as function arguments, Functions returning pointers, Pointers to functions, Pointers and Structures. (10)

#### Text Books:

1. Programming in ANSI C by E. Balagurusamy, Tata McGraw Hill Publishing Company Ltd, 4<sup>th</sup> edition, 2004.

#### Reference Books:

1. Programming with C, K.R.Venugopal, Sudeep.R Prasad Tata McGraw Hill Publishing Company Ltd, 7<sup>th</sup> edition, 2010.
2. Let Us C by Yaswant P. Kanetkar, BPB Publications, Paper back 13<sup>th</sup> edition, 2013.
3. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie, PHI Ltd, 2<sup>nd</sup> edition.

**BCA – I SEMESTER**  
**SCS 105: COMMUNICATION SKILLS - I**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objectives:**

- To encourage the students to speak English
- To enable students to use English in day-to-day communication
- To build up their confidence in the usage of English
- To expose them to prose and poetry and enable them to learn language through simple literature.
- To develop their written communicative competence

**UNIT - I**

**Short Story:** The Bet, Anton Chekov

**Poem:** The Felling of the Banyan Tree, Dilip Chitre.

**Spoken Communication:** Meeting People, Exchanging Greetings and Taking Leave, Introducing Yourself, Introducing People to Others, Giving Personal Information. (8)

**UNIT - II**

**Prose:** Socrates and the Schoolmaster, F. L. Brayne.

**Poems:** Stay Calm, Grenville Kleiser, On Television, Roald Dahl.

**Spoken Communication:** Talking about People and Places, Answering the Telephone and Asking for Someone, Dealing with a Wrong Number, Taking and Leaving Messages. (8)

**UNIT - III**

**Short stories:** An Astrologer's Day, R. K. Narayan, The Gift of the Magi, O' Henry.

**Poem:** Say Not the Struggle Naught Availeth, Arthur Hugh Clough.

**Spoken Communication:** Making Inquiries on the Phone, Calling for Help in an Emergency, Getting People's Attention and Interrupting, Giving Instructions and Seeking Clarifications. (8)

**UNIT - IV**

**Short Story:** With the Photographer, Stephen Leacock.

**Poem:** No Men are Foreign, James Kirkup.

**Spoken Communication:** Making Requests and Responding to Requests, Asking for Directions and Giving Directions, Thanking Someone and Responding to Thanks, Inviting and Accepting and Refusing an Invitation.

**Written Communication:** Summarizing. (10)

**UNIT - V**

**Prose:** Speech on Indian Independence, Jawaharlal Nehru.

**Poem:** Abou Ben Adhem, James Leigh Hunt.

**Spoken Communication:** Apologizing and Responding to an Apology, Congratulating and Responding to Congratulations, Paying Compliments, Showing Appreciation, Offering Encouragement and Responding to them, Asking for, Giving and Refusing Permission.

**Written Communication:** Note Making and Note Taking. (10)

**Text Books:**

1. Prism: Spoken and Written Communication, Prose & Poetry by Board of Editors, Orient Longman, 2008.

**Reference Books:**

1. Speaking English Effectively by Krishna Mohan and N.P.Singh.
2. Spoken English: A self Learning Guide to Conversation practice by SasiKauma . V and P.V.Dhamija.
3. Spoken English: A foundation Course by Sadanand, Kamalesh and Susheela Punitha, Orient Black Swan.

**BCA – I SEMESTER**  
**SCS 107: MATHEMATICS - I**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

Objective: To enable the students to learn about Limits and Differentiation, Integration, Matrices Interpolation and elementary Statistics.

**UNIT - I**

**Limits and Differentiation:** Definition of Limit, Right and Left hand Limits, Derivatives from first Principles, Derivates of Sum, Difference, Product and Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation. (10)

**UNIT - II**

**Integration:** Integral as Limits of Sum, Indefinite Integrals, Methods of Integration Substitution, By Parts Partial Fractions, Integration of Algebraic and Transcendental Functions. (10)

**UNIT - III**

**Interpolation:** Operators, Forward and Backward Difference Operations and Their Interrelation.

Interpolation Formulae: Newton's Forward, Backward and Divided Difference Formulae, Lagrange's Formula. (10)

**UNIT - IV**

**Matrices:** Matrix Types of Matrices, Addition, Subtraction, Multiplication of Matrices, Determinants, Adjoint, Inverse of a Matrix.

**Solution of Algebraic and Transcendental Equations:** Bisection Method, False Position Method, Newton-Raphson Method for Solving Equation Involving one Variable Only. (10)

**UNIT - V**

**Statistics:** Measures of Central Tendency- Mean, Median, Mode, Measures of Dispersion – Quantile Deviation, Standard Deviation, Correlation, Rank Correlation. (10)

**Text Books :**

1. Intermediate Mathematics, Volume – I by V.Venkateswara Rao, N.Krishna Murtyand B.V.S.S.Sarma, S.Chand and Company.
2. Intermediate Mathematics, Volume – I I by V.Venkateswara Rao, N.Krishna Murtyand B.V.S.S.Sarma, S.Chand and Company.
3. Elementary Engineering Mathematics by B.S.Grewal, Khannan Publishers, 2005.

**Reference Books:**

1. Integral Calculus,by Shanti Narayan, S. Chand & Co. 1999.
2. Differential Calculus, by Shanti Narayan, S. Chand & Co. 1998.

**BCA – I SEMESTER**  
**SCS 121: PROGRAMMING WITH C LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Write a C program to demonstrate the use of printf and scanf statements to read and print values of variables of different data types.
2. Write a C program to calculate the area of a triangle
3. Write a C program to perform addition, subtraction, division and multiplication on two floating point numbers.
4. Write a C program to subtract two long integers
5. Write a C program that displays the size of every data type.
6. Write a C program to convert an integer into corresponding float point number.
7. Write a C program to find whether the given number is perfect or not.
8. Write a C program using for loop to calculate factorial of a number.
9. Write a C program using if statement to print all the numbers from m to n there by classifying them as even or odd.
10. Write a C program using do while loop to read the numbers until a 1 is encountered also count the number of prime numbers and composite numbers entered by the user.
11. Write a C program to print the reverse of a number.
12. Write a C program to calculate the GCD of two numbers
13. Write a C program to find the largest of n numbers using arrays.
14. Write a C program to insert a number in an array that is already sorted in ascending order.
15. Write a C program to delete a number from a given location in an array
16. Write a C program to perform (i) addition of matrix (ii) transpose of a 3X3 matrix (iii) multiplication of two matrices.
17. Write a C program to swap two numbers (i) without using temporary variable (ii) using functions.
18. Write a C program to sum the series,,,,,  $1/1!+1/2!+1/3!+\dots\dots\dots+1/n!$
19. Write a C program to print the Fibonacci series using recursion
20. Write a C program (i) to concatenate two strings (ii) to compare two strings (iii) to append a string to another string
21. Write a C program to read and print the text until a \* is encountered. Also count the number of characters in the text entered.
22. Write a C program to enter a text. Then enter a pattern and count the number of times the pattern is repeated in the text.
23. Write a C program using structures to read and display the information about a student
24. Write a C program to read and display the information of all students in the class and edit the details of one student and redisplay the entire information
25. Write a C program to display the name of the colors using an enumerated data type.
26. Write a C program to display the sum and average of numbers from m to n

**Reference Book:**

1. Programming in C by Reema Thareja, Oxford University Press, 2011.



**BCA – I SEMESTER**  
**SCS 123: COMMUNICATION SKILLS – I Lab**

Hours per week: 3

Examination: 100 Marks

Credits: 2

**Objective:**

- To enable the students to acquire LSRW skills
- To enhance teaching and writing skills through web based activities.
- To engage in debates, participate in group discussions and face interviews.
- To create enthusiasm among the learners towards the wide use of internet.
- To develop analytical and critical thinking.
- To instill confidence and speak effectively

**Syllabus**

- Phonetics, vowels, consonants & Diphthongs, Phonetic Transcription
- Stress/ Accent, syllable Division and pronunciation
- Intonation & Rhythm
- Building Vocabulary
- Oral Presentation
- Group Discussion
- Handling Job Interviews
- Telephone Etiquette

**Reference Books:**

1. Developing Communication Skills by Krishna Mohan and Meera Benarji , Macmillan Press.
2. Better English Pronunciation by JDO Connor Cubs , Cambridge University Press.
3. Oxford Grammar with answers by John Eastwood, Oxford University Press.
4. Hand Book if English Grammar and Usage by Mark Leaster and Larry Beason, Tata Mc GrawHill Company.
5. A Text book of English Phonetics for Indian Students by T.BalaSubramanian, Macmillan Press.

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**BCA – II SEMESTER**  
**SCS 102: INTERNET PROGRAMMING**

Hours per week: 4

Credits: 4

End Examination: 60 Marks

Sessionals: 40 Marks

**Objectives:** To enable the student to understand the importance of features like HTML, JavaScript, DHTML and PHP. The main emphasis of this course is to develop the projects using these concepts.

**UNIT-I**

**Internet Basics:** Basic Concepts, Communicating on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP address, Transmission Control Protocols.

**Introduction To HTML:** Information files creation, Web Server, Web Client/Browser, Hyper Text Markup Language (HTML), Commonly used HTML Commands.

**LISTS:** Types of lists. (9)

**UNIT - II**

**Adding Graphics To Html Documents :** Using the Attribute s- Border, Width, and Height, Align and Alt Attributes.

**Tables:** Introduction, The Caption Tag, Using the width and boarder, Cellpadding, Cellspacing, Using Background-Color property, Using the Colspan and Rowspan Attributes.

**Linking Documents:** Links, Images as Hyperlinks.

**FRAMES :** Introduction To Frames. (9)

**UNIT - III**

**Introduction To Javascript:** JavaScript in web pages , The Advantages of JavaScript, Writing JavaScript into HTML, Basic Programming Techniques, Operators and Expressions in JavaScript, JavaScript Programming Constructs, Conditional Checking, Super controlled-endless loops, Functions in JavaScript, User defined functions, Placing text in a Browser ,Dialog Boxes .

**The Javascript Document Object Model:** Introduction ,The JavaScript assisted style sheets DOM (JSSS DOM). **Understanding Objects in HTML:** Browser Objects, Handling (Web page) Events Using JavaScript. (10)

**UNIT - IV**

**Forms used by A Web Site:** The form Object ,Other Built -In objects in Javascript, User Defined Objects.

**Dynamic HTML:** Cascading Style Sheets, Class, Using the <Span>... </SPAN > TAG, External Style Sheets, Using the <DIV> ... </DIV>TAG . (8)

**UNIT-V**

**PHP (Hypertext Preprocessor):** Introduction PHP.

**The Basics of PHP -** Data types, Variables, Constants, HereDocuments, Operators, Arrays, Conditional statements, Iterations, Functions - User Defined functions, Built-In function, PHP Server variables, Working with Date and Time, Performing Mathematical operations, Working with String functions.

(9)

**Text Book:**

1. Web Enable Commercial Application Development Using ... HTML, Javascript, DHTML and PHP by Ivan Bayross, BPB Publications, 4<sup>th</sup> revised edition, 2010 .

**Reference Books :**

1. Complete Reference HTML, T. A. Powell, 3<sup>rd</sup> edition, TMH, 2003.
2. The Complete Reference - PHP by Steven Holzner, Tata McGraw Hill, 2008.
3. Web Technology and Design, Xavier, C, New Age International, 2013.

## BCA – II SEMESTER

### SCS 104: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING WITH C++

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To introduce the students the basic principles of Object oriented programming.

#### UNIT - I

**Principles and Benefits of OOP:** Application of OOP, Benefits of OOP, Keywords, Identifiers & Constants, Data types, Variables, Operators, Manipulators, Expressions, Control Structures. (10)

#### UNIT - II

**Functions:** Prototyping, Parameter passing Techniques, Inline Functions, Default Arguments, Const Arguments, Function Overloading, Friend and Virtual Functions.

**Classes and Objects :** Class, Member Functions, Arrays with in a Class, Memory Allocation for Objects, Static data members, Static member functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Const Member Functions, Pointers to Members. (10)

#### UNIT - III

**Constructors and Destructors:** Constructors and Destructors, Copy constructor, Dynamic Constructor.

**Operator Overloading and Type Conversions:** Overloading Unary operators, Binary Operators, Manipulation of String using Operators, Rules for Overloading Operators.

**Inheritance:** Types of inheritance – Single, Multiple, Multi Level, Hierarchical, Hybrid Inheritance, Virtual Base Classes , Abstract Classes, Constructors in derived Classes.

**Virtual Functions:** Pointers, Pointers to Objects –this Pointer, Pointers to Derived Classes. Pure Virtual Functions. (10)

#### UNIT - IV

**Managing I/O Operations:** C++ Streams, C++ Stream Classes, Unformatted I/O and Formatted I/O Operations, Managing Output with Manipulators.

**Working with Files:** Classes for File Stream Operations, Opening & Closing a File, Detecting end of file, File Pointers & Their Manipulators, Sequential I/O Operations, Updating a File. (10)

#### UNIT - V

**Exception Handling:** Basics of Exception Handling, Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Re-throwing an Exception, Specifying Exceptions, Command Line Arguments. (10)

#### Text Books:

1. Object Oriented Programming with C++ by E.Balagurusamy, Tata McGraw Hill Publishing Company Ltd., 4<sup>th</sup> edition, 2010.

#### Reference Books:

1. Object Oriented Programming with C++ by M.T. Somashekara, D.S. Guru, H.S. Nagendraswamy, K.S. Manjunatha, PHI Learning, 1<sup>st</sup> edition, 2012.

2. Mastering C++ by K R Venugopal, T. Ravishankar, RajKumar, Tata Mc Graw Hill Publishing Company Limited, 2<sup>nd</sup> edition, 2006.

**BCA – II SEMESTER**  
**SCS 106: COMMUNICATION SKILLS - II**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:**

1. To make students aware of the different communicative skills and to develop among them an ability to effectively communicate in English, both in written and spoken modes.
2. To develop linguistic and pragmatic competence among the students and to prepare them to develop competence for self, learning.
3. To encourage and enable the students to read the various types of texts on their own and discuss them among peers.
4. To develop useful writing skills and enable the students to acquire the flair for writing.

**UNIT - I**

**Poem:** Ode to a Nightingale, John Keats.

**Vocabulary development:** Synonyms, Antonyms, One word substitutes, Words often confused, Phrasal Verbs and Idioms, Foreign Phrases. (12)

**UNIT - II**

**Poem:** The Bridal Ballad, Edgar Allan Poe.

**Functional Grammar:** Articles, Prepositions, Tenses, Subject, verb agreement, Concord, Error Analysis, Correction of Sentences. (12)

**UNIT - III**

**Prose:** Spoken English and Broken English, George Bernard Shaw.

**Writing skills I:** Paragraph Writing, Essay Writing, Types of essays, connective devices, Notice, circular, Minutes of the meeting. (8)

**UNIT - IV**

**Prose:** My Mother, Dom Moraes.

**Writing skills II:** Dialogue Writing, Role Play, Letter Writing, (letter of enquiry, Permission, Regret, Reconciliation, Complaint, Breaking the ice), Memo – formats. (8)

**UNIT - V**

**Short story,** The Anti, dote – R.K. Narayan.

**Writing skills, III** Précis Writing, Drafting Curriculum Vitae, Resume and Covering letters, Job applications, Comprehension passages, exercise practice. (10)

**Reference Books:**

1. Current English for Communication by N.Krishna Swamy and T.Sriraman, Macmillan India Ltd.
2. Technical Communicatio : Principles and Practice by Meenakshi Raman and Sangeeta Sarma, Oxford University Press.
3. Businee Communication and report Writing by G.S.R. K. Babu Rao, Himalaya Publishing House.

**BCA – II SEMESTER**  
**SCS 108: MATHEMATICS - II**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To make the student to understand the basic concepts of Set Theory and Relations, Functions and Counting, Logic and Propositional Calculus, Lattices and Boolean Algebra, Graph Theory.

**UNIT - I**

**Set Theory and Relations:** Sets, Set Operations, Algebra of Sets, Classes of Sets, Power Sets, Partitions, Relations, Representations of Relations, Composition of Relations, Types of Relations, Partial Ordering Relations, n-ary Relations. (10)

**UNIT - II**

**Functions and Counting :** Functions, One-to-One, onto and Invertible Functions, Mathematical, Exponential and Logarithmic Functions, Basic Counting Principles, Permutations, Combinations, The Pigeonhole Principle, The Inclusion – Exclusion Principle. (10)

**UNIT - III**

**Logic and Propositional Calculus:** Propositions and Truth Tables, Tautologies, Logical Equivalence, Algebra of Propositions, Arguments, Logical Implication, Propositional Functions, Quantifiers. (10)

**UNIT - IV**

**Lattices and Boolean Algebra:** Ordered, Sets, Hasse Diagrams, Lattices, Distributed Lattices & Complimented Lattices, Boolean Algebra, Sum of Products form for Boolean Algebra. (10)

**UNIT - V**

**Graph Theory:** Graphs, Multi graphs, Directed graphs, Isomorphic Graphs, Paths, Connectivity Complete, Regular and Bipartite Graphs, Planar Graphs, Tree Graphs, Spanning Trees, Kruskal Algorithm, Warshall Algorithm for Path Matrix and Shortest – Path Matrix. (10)

**Text Books:**

1. Discrete Mathematics (Schaum's Outline Series) by Seymour Lipschutz, Marc Lipson, Tata Mc-Graw Hill, 2<sup>nd</sup> edition.
2. Discrete Mathematics and its applications by Kenneth H. Rosen, Tata Mc-Graw Hill.

**Reference Books:**

1. Discrete Mathematical Structures with applications to Computer Science by Tremblay and R.Manohar, Tata McGrawhill education.

**BCA – II SEMESTER**  
**Open Elective-I**

Hours per week: 3  
Credits: 3

End Examination: 60 Marks  
Sessionals: 40 Marks

**BCA – II SEMESTER**  
**SCS 122: PROGRAMMING WITH C++ LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

Write a program to demonstrate control structures

1. Program to perform shift operators.
2. Write a program to demonstrate class structure
3. Write a program to demonstrate data members and member functions
4. Write a program to implement addition of two matrices.
5. Write a program to implement transpose of a matrix.
6. Write a program to the use of functions
7. Write a program to swap numbers using friend function.
8. Write a program to calculate area and circumference of circle using inline function.
9. Write a program to implement function over loading.
10. Write a program to implement operator overloading.
11. Write a program to perform on unary and binary operators.
12. Write a program to implement all Inheritance techniques.
13. Write a program to implement virtual base class.
14. Write a program to demonstrate pointers concept.
15. Write a program to demonstrate pointer to object.
16. Write a program to implement exception handling mechanism.

**Reference Books:**

1. Programming in C by Reema Thareja, Oxford Higher Education, 7<sup>th</sup> Impression, 2013.

**BCA – II SEMESTER**  
**SCS 124: INTERNET PROGRAMMING LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Write a HTML document to demonstrate Formatting tags.
2. HTML document to demonstrate Ordered lists, unordered Lists, definition Lists.
3. Write an HTML document to create table header rows, data rows, caption and attributes of the table tag.
4. Write an HTML document to cell padding and cell spacing, Bgcolor , Colspan and Row span attribute.
5. Write an HTML document using frameset and the targeting named frames.
6. Write a JavaScript to demonstrate different data types.
7. Write a JavaScript to demonstrate different operators.
8. Write a JavaScript to demonstrate for loop and while loop.
9. Write a JavaScript to demonstrate arrays.
10. Write a JavaScript to demonstrate dialog boxes.
11. Write a JavaScript to demonstrate user defined functions.
12. Write a JavaScript to demonstrate built-in functions.
13. Write a JavaScript to create login application using form elements.
14. Program to develop DHTML document Using Text and Border related Attributes.
15. Program to develop DHTML document Using color and background related Attributes.
16. Program to develop DHTML document using <Span> and <Div> tags.
17. Write a PHP Script to demonstrate the variables.
18. Write a PHP Script to demonstrate Conditional statements.
19. Write a PHP Script to demonstrate Here Documents.
20. Write a PHP Script to demonstrate Functions.

**Reference Books:**

1. Web Enable Commercial Application Development Using ... HTML, Javascript, DHTML and PHP by Ivan Bayross, BPB Publications, 4<sup>th</sup> revised edition, 2010.
2. Complete Reference HTML, T. A. Powell, 3<sup>rd</sup> edition, TMH, 2003.
3. The Complete Reference - PHP by Steven Holzner, Tata McGraw Hill, 2008.
4. Web Technology and Design, Xavier, C, New Age International, 2013

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## BCA – III SEMESTER

### SCS 201: ELEMENTARY DATA STRUCTURES USING C++

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

#### Objective:

- To understand the linear and non linear data structures available in solving problems.
- To know about the sorting and searching techniques and its efficiencies
- Using the data structures and algorithms in real time applications
- Able to design their own data structure according to the application need.

#### UNIT - I

**Fundamental Concepts:** Introduction to Data Structures, Types of Data Structures, Implementation of data structures, Analysis of Algorithms.

**Complexity of algorithms:** Space complexity, Time complexity.

**Linear Data Structure Using Arrays:** Sequential Organization, Linear Data Structure .

**Using Sequential Organization:** Arrays, Array as an Abstract Data Type, Memory Representation and Address Calculation, The Class Array, Inserting an element into an array, Deleting an element, Pros and Cons of Arrays, Applications of arrays, Sparse Matrix. (7)

#### UNIT - II

**Stacks:** Primitive operations, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization (Arrays), Applications of Stack, Expression Evaluation and Conversion Polish notation and expression.

**Queues:** Concept of Queues, Queue as Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Advantages of using circular queues, Array implementation of priority queue. (12)

#### UNIT - III

**Linked Lists:** Introduction, Linked List, Comparison of sequential and linked organizations, Linked list terminology, Primitive operations, Realization of Linked Lists using arrays, Linked list using dynamic memory management.

**Linked List Abstract Data Type:** Data structure of node, Insertion of a node, Linked list traversal, Deletion of a node, Types of linked list, Linear and Circular linked lists, Linked Stack, Linked Queues. (10)

#### UNIT - IV

**Trees:** Introduction, Basic terminology, Types of Trees, Binary Tree, Properties of a binary tree, Binary Tree Abstract Data Type, Array implementation of binary trees, Linked implementation of binary trees, Binary Tree Traversal, Conversion of General Tree to Binary Tree.

**Binary Search Tree:** Basic Concepts, Traversals, Creation, Insertion, Deletion of binary search trees. (8)

#### UNIT - V

**Graphs:** Introduction, ADT of Graph, Representation of Graph, Graph Traversal, Spanning Trees.

**Searching:** Search Techniques, Sequential Search, Binary search.

**Sorting:** Types of sorting, General sort concepts, Bubble sort, Insertion sort, Selection sort Quick sort. (8)

#### Text Books:

1. Data Structures using C++ by Varsha H.Patil, Oxford University Press, New edition, 2012.

**Reference Books:**

1. Fundamentals of Data Structures in C++ by Ellis Horowitz, Sartaj Sahni and Susan Anderson, Freed, 2<sup>nd</sup> edition 2008.
2. Data Structures using C++ by D.S.Malik, Cenage Learning, 2<sup>nd</sup> edition, 2009.

**BCA – III SEMESTER**  
**SCS 203: INTRODUCTION TO UNIX PROGRAMMING**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** The student is given the overview of operating systems and salient features of UNIX operating system. Also given the description of Unix Built in Commands, AWK and Shell Programming.

**UNIT - I**

**Introduction:** Operating System, OS Types, Salient Features of UNIX, Various UNIX, History of Unix, Unix System, Unix for Dos Users. (8)

**UNIT - II**

**File and Directory Structure:** Files, Type of Files, File Terminology, File Name Generation, File System, Directory, Path Name, Devices, Permission on Files and Directories.

**Editors:** Stream Editor, Screen Editor, Line Editor. (10)

**UNIT - III**

**Unix Built In Commands:** File Manipulation commands, Directory Manipulation Commands, Text Processing Commands, Networking and Communication Commands, General Purpose Commands, Day to Day Commands, Help commands, Terminal and Screen Commands, Processes Commands, Listing the Files. (10)

**UNIT - IV**

**AWK:** Pre Defined statements in awk, Arrays.

**Shell Programming:** Overview, Command Line, Redirection, PIPES, TEE Command, Meta Characters, Quoting, Shell Variables, Sub Shells, Functions. (12)

**UNIT - V**

**Unix Utilities and Shell Programming:** Unix Utilities, Shell Script. (10)

**Text Books:**

1. Unix Concepts and Programming by Murugan Sethuraman, Denet and Company, 2006.

**Reference Books:**

1. Unix Concepts by Sumitaba Das, TMH Publications, 4<sup>th</sup> edition, 2006.

## BCA – III SEMESTER

### SCS 205: INTRODUCTION TO DIGITAL LOGIC CIRCUITS

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To impart knowledge about Boolean algebra, Digital logic fundamentals, Design steps of flip flops, Shift registers, Counters etc.

#### UNIT - I

**Binary Systems:** Digital Systems, Binary numbers, Number base conversion, Octal & Hexa decimal Numbers, Complements, Signed Binary numbers, Binary codes, Binary storage and registers, Binary Logic. (10)

#### UNIT - II

**Boolean Algebra and Logic Gates:** Basic Definition, Axiomatic definition of Boolean Algebra, Theorems and properties, Canonical form & Standard Form, Other Logic Operations, Digital Logic Gates, ICS. (10)

#### UNIT - III

**Gate Level Minimisation:** Introduction, Map Method, Four and Five variable maps, POS Simplification, Don't care conditions, NAND and NOR Implementation, Other two Level Implementation, Ex-OR function. (10)

#### UNIT - IV

**Combinational Circuits:** Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoder, Encoder, Multiplexer. (10)

#### UNIT - V

**Synchronous Sequential Circuits:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State reduction and Assignment, Design procedure.

**Registers and Counters:** Registers, Shift registers, Ripple Counters. (10)

#### Text Books:

1. Digital Design by M. Morris Mano, Michael D.Ciletti, Pearson edition, 4<sup>th</sup> edition. 2012.

#### Reference Books:

1. Fundamentals of Digital Logic Design by Stephen Brown and Zvonko Vranesic, Mc Graw Hill Education, 3<sup>rd</sup> edition, 2009.

**BCA – III SEMESTER**  
**SCS 207: INTRODUCTION TO OPERATING SYSTEMS**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system. To understand the basic working process of an operating system.

**UNIT - I**

**Introduction and System Structures:** What Operating Systems Do, Computer System Architecture, Operating System Structure, Protection And Security, Distributed Systems, Special Purpose Systems, Computing Environments, Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, OS Design And Implementation, Operating System Structure, Virtual Machines. (10)

**UNIT - II**

**Process Management:** Process Concept, Process Scheduling, Operations On Processes, Inter Process Communication.

**Process Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms. (10)

**UNIT - III**

**Process Synchronization:** Background, Critical Section Problem, Peterson's Solution, Classic Problems Of Synchronization,

**Deadlock:** System Model, Deadlock Characterization, Methods for Handling Deadlock, Deadlock Prevention, Avoidance and Detection, Recovery from Deadlock. (14)

**UNIT - IV**

**Memory Management:** Memory Management Strategies, Background, Swapping, Contiguous Memory allocation, Paging, Structure of the page table, Segmentation. (10)

**UNIT - V**

**Virtual memory:** Background, Demand paging, Page replacement, Allocation of frames, Thrashing, Other considerations. (10)

**Text Books:**

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley India Publication, 8<sup>th</sup> edition, Reprint 2012.

**Reference Books:**

1. Operating Systems: Internals and Design Principles by Stalling William, Prentice Hall, 7<sup>th</sup> edition, 2011.
2. Operating System by Dietel, Pearson Education, 3<sup>rd</sup> edition, 2004.
3. Modern Operating Systems by A.S. Tanenbaum, Prentice Hall, 3<sup>rd</sup> edition, 2007.

**BCA – III SEMESTER**  
**Open Elective - II**

Hours per week: 3  
Credits: 3

End Examination: 60 Marks  
Sessionals: 40 Marks

**BCA – III SEMESTER**  
**SCS 221: DATA STRUCTURES USING C++ LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Implementation of Array Operations.
2. Implementation of Sparse Matrix Addition, Multiplications.
3. Array implementation of stack.
4. Array implementation of Queue.
5. Implementation of circular queue ADT using an array.
6. Implementation of conversion of expressions.
7. Implementation of Postfix Expression Evaluation.
8. Implementation of Singly Linked List operations, insertion, deletion, display, reverse.
9. Implementation of Linked Stack Operations.
10. Implementation of Linked Queue Operations.
11. Implementation of Binary Search Tree Creation, Traversals.
12. Implementation of Graph Traversals.
13. Implementation of Linear Search, Binary Search.
14. Implementing the following sorting methods.
  - a. Bubble sort
  - b. Insertion sort
  - c. Selection Sort
  - d. Quick Sort

**References Books:**

1. Data Structures with C++ by John R. Hubbard, TMH, 1<sup>st</sup> edition, 2004.
2. Data Structures using C& C++- Rajesh K Shukla-Wiley, 2009.
3. Data Structures using C++ by Varsha H Patil, Oxford University Press-, New edition, 2012.

**BCA – III SEMESTER**  
**SCS 223: UNIX PROGRAMMING LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Practice the commands encountered in the syllabus.
2. Write a shell script to compare two strings.
3. Write a shell script to find the length of the strings.
4. The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a rank as per the following rules: Percentage above or equal to 60, First Rank  
Percentage above 50 and 59, Second Rank, Percentage above 40 and 49, Third Rank, Percentage less than 40, Fail.
5. Write a shell script to display file permissions along with their names.
6. Write a shell script to prints date, no of users and personal status.
7. Write a shell script which accepts a number and displays the list of even numbers from given numbers.
8. Write a shell script that prints out date information in this order: TIME, DAY OF WEEK, DAY NUMBER, MONTH, YEAR Like 20:10:42 Mon 29 Jun 2015.
9. Write a shell script to display the following details in a pay slip.  
Payslip Details: 1. House Rent Allowance, 2. Dearness Allowance, 3. Provident Fund
10. Write a shell script to reverse the digit.
11. Write a program to check whether a given number is even or odd.
12. Program to generate Fibonacci series up to N.

**Reference Books:**

1. Unix Concepts and Programming by Murugan Sethuraman, Denet and Company, 2006.
2. Unix Concepts by Sumitaba Das, TMH Publications, 4<sup>th</sup> edition, 2006.

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## BCA – IV SEMESTER

### SCS 202: INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To study in detail about the Fundamentals of Database Management Systems, Various models of Database and its related application.

#### UNIT - I

**Introduction:** Database-Systems Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object based and Semi structured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems. (10)

#### UNIT - II

**Relational Model:** Structure of Relational Databases, Fundamental Relational Algebra Operations, Additional Relational Algebra operations, Extended Relational Algebra operations, Null Values, Modification of the Database. (12)

#### UNIT - III

**SQL:** Data Definition, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Complex Queries, Views, Modification of the Database, Joined Relations. (10)

#### UNIT - IV

**Database Design and E-R Model:** Entity-Relationship Model, Constraints, Entity Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Extended E-R Features, Database Design for Banking Enterprise, Reduction to Relational Schemas, UML. (8)

#### UNIT - V

**Relational Database Design:** Features of Good Relational Design, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Functional Dependency Theory, Decomposition Using Functional Dependencies, Decomposition Using Multi-valued Dependencies, more Normal Forms, Database design Process & Modeling Temporal Data. (10)

#### Text Books:

1. Database System Concepts by Henry F.Korth and S.Sundarshan, MC Graw Hill Higher Education, 5<sup>th</sup> edition, 2006.

#### Reference Books:

1. Database Management Systems by RaghuramaKrishnan and James Gerhke, MC Graw Hill Higher Education, 3<sup>rd</sup> edition.

**BCA – IV SEMESTER**  
**SCS 204: DATA COMMUNICATIONS**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To introduce the students the evolution of computer networks, the concepts of data communication and the general principles of network design and compare the different network topologies.

**UNIT - I**

**Data Communications:** Components, Data Representation, Data Flow.

**Networks:** Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks, Interconnection of Networks.

**Network Models:** Layered Tasks - Sender, Receiver and Carrier, Hierarchy.

**The OSI Model:** Layered Architecture, Peer-to-Peer Processes, Encapsulation.

**Layers in the OSI Model:** Physical, Data Link, Network, Transport, Session, Presentation, Application.

**TCP/IP Protocol Suite:** Physical and Data Link Layers, Network Layer, Transport Layer, Application Layer. (9)

**UNIT - II**

**Digital Transmission - Transmission Modes:** Parallel Transmission, Serial Transmission.

**Multiplexing:** Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. (8)

**UNIT - III**

**Transmission Media - Guided Media:** Twisted Pair Cable, Coaxial Cable, Fiber-Optic Cable.

**Unguided Media:** Radio Waves, Microwaves, Infrared.

**Switching- Circuit Switched Networks:** Three Phases, Efficiency, Delay, Circuit-Switched Technology in Telephone Networks.

**Datagram Networks:** Routing Table, Efficiency, Delay, Datagram Networks in the Internet. (9)

**UNIT - IV**

**Data Link Layer:** Introduction - Types of Errors, Redundancy, Detection versus Correction, Forward Error Correction Versus Retransmission.

**Block Coding:** Error Detection, Error Correction, Hamming Distance, Minimum Hamming Distance.

**Data Link Control - Framing:** Fixed Size Framing, Variable Size Framing.

**Flow and Error Control:** Flow Control, Error Control.

**Noiseless Channels:** Simplest Protocol, Stop-and-Wait Protocol. (11)

**UNIT - V**

**Wired LANs - IEEE Standards:** Data Link Layer, Physical Layer.

**Standard Ethernet:** MAC Sub layer, Physical Layer.

**Changes in the Standard:** Bridged Ethernet Switched Ethernet, Full Duplex Ethernet.

**Fast Ethernet:** MAC Sub Layer, Physical Layer.

**Gigabit Ethernet:** MAC Sub layer, Physical Layer, Ten-Gigabit Ethernet. (10)

**Text Books:**

1. Data Communication and Networking by Behrouz A Forouzan, Tata McGraw Hill, 4<sup>th</sup> edition, 5<sup>th</sup> reprint, 2007.

**Reference Books:**

1. Data and Computer Communications by William Stallings, Pearson Publications, 9<sup>th</sup> edition, 2011.
2. Data Communication and Computer Networks by Ajit Pal, PHI Learning 1<sup>st</sup> edition, 2013.

## BCA – IV SEMESTER

### SCS 206: INTRODUCTION TO JAVA PROGRAMMING

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** The aim of the course is to make the students to learn the basic concepts of Java programming. This course covers preliminaries and makes the students learn how to program in basic concepts, packages, Interfaces, threads. Exception Handling, String Handling, Applets in Java and allow the students to implement effectively.

#### UNIT – I

**The Primaries and Control Statements:** Introduction to Java , Features of Java, Object Oriented Concepts, Lexical Issues, Data Types, Variables, Arrays, Operators, Control Statements. (8)

#### UNIT – II

**Classes and Objects:** Classes, Objects, Constructors, Overloading methods, Overloading Constructors, Using Objects as Parameters, Understanding static, Introducing Inner Classes, Inheritance, Overriding methods, Dynamic Method Dispatch, Abstract class. (9)

#### UNIT – III

**Packages, Interfaces and Exception Handling:** Packages, Access Protection, Importing Packages, Interfaces, Exception Handling, Throw and Throws finally. (8)

#### UNIT – IV

**Multithreaded Programming and String Handling:** The Java Thread Model , Main Thread, creating Thread, Extending Thread, Creating Multiple Threads , Using isAlive() and join(), Thread Priorities, String Handling, String Constructors, Special string operations, Character extractions, String comparisons, Modifying a string. (9)

#### UNIT – V

**Applets:** Applet Basics, Applet Architecture, Applet Skeleton, Simple Applet display methods, Requesting Repainting, Simple Banner Applet, HTML Applet Tag.

**Event Handling:** Two Event Handling Mechanisms, Event Classes, Event Listener Interfaces, Adapter Classes. (9)

#### Text Books:

1. The Complete Reference Java2, Herbert Schildt, 5<sup>th</sup> edition, TMH, 2009.

#### Reference Books:

1. The Java Programming Language by K. Arnold and J. Gosling, Pearson Education, 3<sup>rd</sup> edition, 2005.

2. Java in a Nutshell: A Desktop Quick Reference for Java Programming by David Flanagan, Rammers, O'Reilly and Associates, Inc. 1999.

3. Thinking in Java by Bruce Eckel, Prentice Hall, 2<sup>nd</sup> edition, 2002.

**BCA – IV SEMESTER**  
**SCS 208: PRINCIPLES OF SOFTWARE ENGINEERING**

Hours per week: 4  
Credits: 4

End Examination: 60 Marks  
Sessionals: 40 Marks

**Objective:** The aim of this course is to provide the students Software Engineering features. Software engineering is therefore, a critically important technology for the future of mankind. There is an increased emphasis on agile methods and software reuse. The agile methods have their place but so too does traditional plan-driven software engineering. We need to combine the best of these approaches to build better software systems. Hence the study is very useful to the students.

**UNIT - I**

**Introduction to software Engineering:** Professional software development, Software Engineering Ethics, Case studies.

**Software processes:** Software process models, Process activities, Coping with change, The rational unified process. (10)

**UNIT - II**

**Agile software development:** Agile methods, Plan-driven and agile development, Contents, Extreme programming, Agile project management, scaling agile methods.

**Requirements Engineering:** Functional and non-functional requirements, The software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation & analysis, Requirements validation, Requirements management. (12)

**UNIT - III**

**System modeling:** Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering. (8)

**UNIT - IV**

**Architectural design:** Architectural design decisions, Architectural views, Architectural patterns Application architectures. (8)

**UNIT - V**

**Design and Implementation:** Object-oriented design using the UML, Design patterns, Implementation issues, Open source development. (8)

**Text Books:**

1. Software Engineering by Ian Sommerville, Pearson publishers, 9<sup>th</sup> edition, 2013.

**Reference Books:**

1. Software Engineering: A Practitioner's Approach by Roger S Pressman, Tata Mcgraw Hill, 6<sup>th</sup> edition, 2005.
2. Fundamentals of Software Engineering by Rajib Mall, PHI Learning Pvt. Ltd., 3<sup>rd</sup> edition, 2009.

**BCA – IV SEMESTER  
GENERIC ELECTIVE – I  
SCS 242: SYSTEMS PROGRAMMING**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To give an overview to the students on working of IBM machine 360 and 370 and knowledge about language processing, and working of assemblers, macros and compilers.

**UNIT - I**

**Machine Structure, Machine Language and Assembly Language:** General Machine Structure, General approach to a new machine.

**Machine structure:** 360 and 370, Memory, Registers, Data and Instructions, Special features.

**Machine Language:** Long way, No looping, Address modification using instructions as data, Address modification using Index Registers, Looping.

**Assembly Language:** Assembly language program, Example using literals. (10)

**UNIT - II**

**Assemblers:** General design procedure, Design of assembler, Statement of the problem, Data structures, Format of data bases, Algorithm, Look for modularity. (10)

**UNIT - III**

**Macro Language and the Macro Processor:** Macro Instructions, Features of a Macro facility, Macro instruction arguments, Conditional macro expansion, Macro calls within macros, Macro instructions defining macros, Implementation of a two pass algorithm & Single pass algorithm, Implementation of Macro calls within macros, Implementation within an assembler. (12)

**UNIT - IV**

**Loaders:** Loader schemes, Compile-and-go-Loaders, General loader scheme, Absolute Loaders, Subroutine linkages, Relocating Loaders, Direct Linking Loaders, Other loader schemes - Binders, Linking loaders, Overlays, Dynamic Binders,

**Design of Absolute Loader:** Design of Direct-Linking Loader, Specification of problem, Specification of data structures, Format of data structures, Format of data bases-algorithm. (10)

**UNIT - V**

**Compilers -Statement of Problem:** Recognizing Basic elements, Recognizing syntactic units and interpreting meaning, Intermediate form, Storage allocation, Code generation and optimization, General model of compiler.

**Phases of Compiler:** Lexical phase, Syntax phase, Interpretation phase, Optimization, Storage assignment, Code generation, Assembly phase, Passes of compiler, Data structures, Statement of problem-implementation, Implementation, Recursion, Call and return statements, Storage classes. (12)

**Text Books:**

1. Systems Programming by John J.Donovan, McGraw-Hill Education Pvt Ltd., 2009.

**Reference Books:**

1. Systems Programming and Operating System by Dhamdhare, Pearson Education, 5<sup>th</sup> edition, 2003.

**BCA – IV SEMESTER**  
**GENERIC ELECTIVE – I**  
**SCS 244: COMPUTER SYSTEM ARCHITECTURE**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

Objective: To enable the student in developing good understanding of a complete computer system through integrated approach to hardware, software and processor design.

**UNIT – I**

**Digital Components:** ICs, Decoders, Multiplexers, Registers, Shift registers, Binary Counters, Memory Unit. (10)

**UNIT – II**

**Data Representation:** Data types, Complements, Fixed Point Representation, Floating Point representation, Binary Error Detection Codes. (10)

**UNIT - III**

**Register Transfer and Micro Operations:** RTL, Inter Register Transfer, Arithmetic, Logic and Shift Micro Operations, ALU. (10)

**UNIT – IV**

**Basic Computer Organisation and Design:** Instructions Codes, Registers, Computer instructions, Timing and Control, Execution of Instructions, Timing and Control, Instruction Cycle, Memory reference Instructions, IO and Interrupt, Design of a computer. (10)

**UNIT - V**

**Central Processing Unit:** General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC. (10)

**Text Books:**

1. Computer System Architecture, by M. Morris Mano, Pearson Publication, 3<sup>rd</sup> edition, 2007.

**Reference Books:**

1. Computer System Organisation, by Naresh Jotwani , Tata MC Graw Hill, 2009.

**BCA – IV SEMESTER  
GENERIC ELECTIVE – I  
SCS 246: PRINCIPLES OF PROGRAMMING LANGUAGES**

Hours per week: 4  
Credits: 4

End Examination: 60 Marks  
Sessionals:40 Marks

**Objective:** Presents the concepts of programming languages to enable students to use more than one language.

**UNIT - I**

**Introduction:** Preliminaries, Evolution of the Major Programming Languages.

**Describing Syntax and Semantics:** Formal methods of describing syntax, Attribute Grammars.

**Describing meaning of programs:** Dynamic Semantics. (12)

**UNIT - II**

**Names, Binding, Type Checking, Data Types, Subprograms and Scopes:** The concept of binding, type compatibility, Scope & life time, Pointers types, Parameter passing methods. (10)

**UNIT - III**

**Support for Object Oriented Programming: Design issues for object oriented languages,** Support for OOP in - Small talk, C++, JAVA, C#, ADA 95, Ruby, JAVA Script. Implementation of object oriented constructs. (10)

**UNIT - IV**

**Functional Programming languages:** Fundamentals of Functional Programming languages, The First Functional Programming Language LISP, An introduction to Scheme, Common LISP, ML, Haskell. (10)

**UNIT - V**

**Logic Programming Languages:** Introduction, Brief introduction for Predicate Calculus, Predicate Calculus and Proving Theorems, An Overview of Logic Programming, The Origins of Prolog, The basic elements of Prolog, Deficiencies of Prolog, Applications of Logic Programming. (10)

**Text Books:**

1. Concepts of Programming Languages by Robert W. Sabesta, Pearson Education, 6<sup>th</sup> edition, 2004.

**Reference Books:**

1. Programming Languages – Design and Implementation by Terrance W. Pratt, Marvin V.Zelkowitz, Prentice Hall, 4<sup>th</sup> edition, 2001.

2. Principles of Programming Languages: Design, Evaluation, and Implementation Hardcover by Bruce J. MacLennan, Oxford University Press, 3<sup>rd</sup> edition, 1999.



**BCA – IV SEMESTER**  
**SCS 222: DATABASE MANAGEMENT SYSTEMS LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Understanding the fundamentals of a relational database.
2. Understanding the fundamentals of client-server applications.
3. Understanding the use of Structured Query Language (SQL).
4. Data definition language.
5. Data manipulation language.
6. Data control language.
7. Understanding and writing SQL /PL\_SQL queries to create, report, and update data in a relational database.
8. Understanding the purpose and be able to create views, scripts, triggers, and Transactions.

**Text Books:**

1. Introduction to Relational Databases and SQL Programming by Christopher Allen, Simon Chatwin, Catherine A. Vreary, Tata McGraw-Hill,

**Reference Books:**

1. Oracle SQL and PL/SQL Hand book by John Adolph Palinski, Pearson Education.
2. Oracle 9i PL/SQL Programming by Scott Urman, Tata McGraw Hill.

**BCA – IV SEMESTER**  
**SCS 224: JAVA PROGRAMMING LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Program to demonstrate various data types.
2. Program to demonstrate single dimensional, multi dimensional arrays.
3. Program to demonstrate various arithmetic operators.
4. Program to demonstrate relational operators.
5. Program to demonstrate various control structures or control statements.
6. Program to demonstrate classes and objects.
7. Program to demonstrate constructors and different number of parameters passed to constructors.
8. Program to demonstrate overloading methods.
9. Program to demonstrate overloading constructors.
10. Program to demonstrate static variable and static class.
11. Program to demonstrate single inheritance.
12. Program to demonstrate multilevel inheritance.
13. Program to demonstrate method over riding.
14. Program to demonstrate dynamic method dispatch.
15. Program to demonstrate Abstract Classes.
16. Program to demonstrate packages.
17. Program to demonstrate Interfaces.
18. Program to demonstrate built in exceptions.
19. Program to demonstrate Throw, throws, finally.
20. Program to demonstrate Banner Applet.
21. Program to demonstrate different control on applets.
22. Program to demonstrate the Mouse Event Handlers.

**Reference Books:**

1. The Complete Reference Java2, Herbert Schildt, 5<sup>th</sup> edition, TMH, 2009.

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**BCA – V SEMESTER**  
**SCS 301: COMPUTER NETWORKS**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals:40 Marks

**Objective:** To produce a core knowledge of networking concepts and techniques to design simple network, provide in-depth knowledge about the various communication technologies and enable the student to understand how information are transmitted in networks.

**UNIT - I**

**Connecting Devices:** Passive Hubs, Repeaters, Active Hubs, Bridges, Two-Layer Switches, Routers, Three-Layer Switches, Gateway.

**Backbone Networks:** Bus Backbone, Star Backbone, Connecting Remote LANs.

**Virtual LANs:** Membership, Configuration, Communication between Switches, IEEE Standard, Advantages. (12)

**UNIT - II**

**Network Layer Logical Addressing:** Ipv4 Addresses - Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation.

**IPv6 Addresses:** Structure, Address Space.

**Network Layer Internet Protocol:** Internetworking - Need for Network Layer, Internet as a Datagram Network, Internet as a Connectionless Network.

**IPv4:** Datagram, Fragmentation, Checksum, Options. (10)

**UNIT - III**

**Transport Layer – Process-to-Process Delivery:** Client/Server Paradigm, Multiplexing and Demultiplexing, Connectionless versus Connection Oriented Service, Reliable Versus Unreliable, Three protocols.

**User Datagram Protocol:** Well-Known Ports for UDP, User Datagram, Checksum, UDP Operation, Use of UDP. (10)

**UNIT - IV**

**Congestion Control and Quality of Service – Data Traffic :** Traffic Descriptor, Traffic Profiles, Congestion- Network Performance, Congestion Control - Open Loop Congestion Control, Closed Loop Congestion Control.

**Application Layer – Domain Name System: Name Space-** Flat Name Space, Hierarchical Name Space, Domain Name Space- Label, Domain Name, Domain.

**Distribution of Name Space:** Hierarchy of Name Servers, Zone, Root Server, Primary and Secondary Servers. (12)

**UNIT - V**

**Cryptography – Introduction:** Definitions, Two Categories.

**Symmetric Key Cryptography:** Traditional Ciphers, Simple Modern Ciphers, Modern Round Ciphers, Mode of Operation.

**Network Security - Security Services:** Message Confidentiality, Message Integrity, Message Authentication, Message Nonrepudiation, Entity Authentication.

**Message Confidentiality:** Confidentiality with Symmetric Key Cryptography, Confidentiality with Asymmetric Key Cryptography. (10)

**Text Books:**

1. Data Communication and Networking by Behrouz A Forouzan, Tata McGraw Hill, Fourth edition. 2007.

**Reference Books:**

1. Data and Computer Communications by William Stallings, Pearson publications, 9<sup>th</sup> edition, 2011.
2. Computer Networks by Andrew S.Tanenbaum, Prentice Hall India, 5<sup>th</sup> edition, 2012.
3. Computer Networking - A Top Down Approach by James F. Kurose and Keith W. Ross, Addison Wesley, 5<sup>th</sup> edition, 2009.

**BCA – V SEMESTER**  
**SCS 303: INTRODUCTION TO CRYPTOGRAPHY**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To enable the students to understand the importance of information security and make them to understand the cryptographic techniques.

**UNIT - I**

**Introduction:** Security goals, Confidentiality, Integrity, Availability, Attacks, Attacks threatening Confidentiality, Attacks Threatening Integrity, Attacks Threatening Availability, Passive versus Active Attacks, Services and Mechanism, Security Services, Security Mechanisms, Relation Between Services and Mechanisms, Techniques, Cryptography, Steganography. (10)

**UNIT - II**

**Traditional Symmetric Key Ciphers:** Introduction, Kerckhoff's Principle, Cryptanalysis, Categories of Traditional ciphers, Substitution Ciphers, Mono alphabetic ciphers, Poly alphabetic Ciphers, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining two approaches. (13)

**UNIT - III**

**Stream and Block Ciphers:** Stream ciphers, Block Ciphers, Combination, Introduction to Modern Symmetric Key cipher, Modern Block Ciphers-Substitution or Transposition, Block Ciphers as Permutation Groups, Components of Modern Block Cipher, S-Boxes. (11)

**UNIT - -IV**

**Product Ciphers:** Introduction, two Classes of Product Ciphers, Feistel Ciphers, Non-Feistel Ciphers, Attacks on Blocks Ciphers, Modern Stream Ciphers. (8)

**UNIT - V**

**Data Encryption Standard (DES):** Introduction, DES Structure, Multiple DES.

**Asymmetric-Key Cryptography:** Introduction, RSA Cryptosystem. (10)

**Text Books:**

1. Cryptography and Network Security by Behrouz A. Forouzan, Tata McGraw-Hill Special Indian edition, 2007.

**Reference Books:**

1. Cryptography and Network Security by William Stallings, Pearson Education, 2011.  
2. Cryptography and Network Security by Atul Kahate, Tata McGraw-Hill Publishing Company Limited, 2003.

**BCA – V SEMESTER**  
**SCS 305: FUNDAMENTALS OF CLOUD COMPUTING**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To make the students learn the introductory concepts of cloud, different services, deployment models and the architecture.

**UNIT - I**

**Define:** What is a cloud? Hype cycle, Implantation gap, Common Definition Metaphorical Interpretation, Attributes.

**Cloud Architecture:** Stack, Management Layers, Standards and Interoperability, Private Cloud, Community Cloud, Hybrid Cloud, Cloud Maturity. (8)

**UNIT - II**

**Infrastructure as a Service:** Infrastructure Stack, Servers, Storage, Network, Integration, Management, Payment and Billing, IaaS Landscape.

**Platform as a Service :** Web Application Frameworks, Web Hosting Services, Google App Engine, Microsoft Windows Azure, Force.com, Additional Platforms.

**Software as a service:** Customer Relationship Management, Human Resources, Financial, Collaboration, Backup and Recovery, Industry Solutions. (10)

**UNIT - III**

**Benefits and Challenges:** Benefits, Challenges, Recommendations.

**Strategic Impact:** What is Strategy? Strategic Analysis, External Analysis, Internal Analysis, Strategic Realignment.

**Risk Impact:** Notion of Risk, Risk Management, Cloud Impact, Enterprise Wide Risk Management.

**Financial Impact:** Resource Costs, Return on Investment, Cash Flow, Financial Visibility, Return on Assets. (10)

**UNIT - IV**

**Requirements Analysis:** Strategic Alignment, Architecture Development Cycle.

**Draft Architecture:** Business Process Modeling, Architecture Modeling, Preliminary Design.

**Application Inventory:** Options, Stakeholders, Business criteria, Technical criteria, Cloud Opportunities, Analysis, Net Benefit and Risk, New Opportunities.

**Service Components:** Service Delivery Model, Potential Providers, Evaluation Criteria and Weight. (12)

**UNIT - V**

**User Profiles:** Options, Segmentation Criteria, Profile Classification, Application Map, Identity Management, Compliance.

**End-to-end Design:** Technical Design, Devices, Connectivity, Physical Infrastructure, Management, Metering and Billing, Hybrid Cloud Design.

**Connectivity:** Network Connectivity, Content Delivery Networks, Application Connectivity, Information Connectivity. (10)

**Text Books:**

1. Cloud Computing Explained by John Rhoton, Recursive Press, 2013.

**Reference Books:**

1. Cloud Computing, Principles, Systems and Applications by Nick Antonopoulos and Lee Gillam, Springer International edition, 2015.
2. Cloud Computing Principles and Paradigms by Raj Kumar Buyya, James Broberg and Anderzej Goscincinski, Wiley Publications, 2011.

## BCA – V SEMESTER

### SCS 307: BUSINESS INTELLIGENCE AND DECISION SUPPORT SYSTEMS

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals:40 Marks

**Objectives:** This course helps students to analyze data for the purpose of helping enterprise users to make better business decisions. This provides comprehensive knowledge of all factors that affect a business therefore enabling optimal decisions to be made. This course provides an introduction and practical guide to the mathematical models and analysis methodologies vital to business intelligence.

#### UNIT - I

**Introduction to Business intelligence :** Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Cycle of a business intelligence analysis, Enabling factors in business intelligence projects, Development of a business intelligence system, Ethics and business intelligence. (8)

#### UNIT - II

**Decision support systems:** Definition of system, Representation of the decision-making process, Rationality and problem solving, the decision-making process, Types of decisions, Approaches to the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system

**Data warehousing:** Definition of data warehouse, Data warehouse architecture, ETL tools, Metadata, Cubes and multidimensional analysis, Hierarchies of concepts and OLAP operations, Materialization of cubes of data (8)

#### Unit - III

**Mathematical models for decision making:** Structure of mathematical models, Development of a model, Classes of models.

**Data Mining:** Definition of Data Mining, Representation of input data, Data Mining Process, Analysis Methodologies.

**Data Preparation:** Data Validation, Data Transformation, Data Reduction. (12)

#### UNIT - IV

**Time series Data in BI :** Definition of time series, Index numbers, Evaluating time series models, Distortion measures, Dispersion measures, Tracking signal, Analysis of the components of time series, Moving average, Decomposition of a time series, Exponential smoothing models, Simple exponential smoothing, Exponential smoothing with trend adjustment, Exponential smoothing with trend and seasonality, Simple adaptive exponential smoothing, Exponential smoothing with damped trend, Initial values for exponential smoothing models, Removal of trend and seasonality, Autoregressive models, Moving average models, Autoregressive moving average models, Autoregressive integrated moving average models, Identification of autoregressive models, Combination of predictive models, the forecasting process, Characteristics of the forecasting process, Selection of a forecasting method. (12)

#### UNIT - V

**Business intelligence applications: Marketing models -Relational marketing,** Motivations and objectives, An environment for relational marketing analysis, Lifetime value, The effect of latency in predictive models, Acquisition, Retention, Cross-selling and up-selling, Market basket analysis,



Web mining, Business case studies, Retention in telecommunications, Acquisition in the automotive industry, Cross-selling in the retail industry. (10)

**Text Books:**

1. Business Intelligence: Data Mining and Optimization for Decision Making by Carlo Verzellis, Wiley Publisher, 2009.

**Reference Books:**

1. Decision Support Systems for Business Intelligence by Vicki L. Sauter, Wiley Publisher, 2<sup>nd</sup> edition, 2010.
2. Business Intelligence by Rajiv Sabherwal, Irma Becerra-Fernandez, Wiley, 2010.

**BCA – V SEMESTER**  
**GENERIC ELECTIVE - II**  
**SCS 341: ADVANCED JAVA PROGRAMMING**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals:40 Marks

Objective: To enable the student to understand the importance of various advanced java features like Swing, Java Database Programming, Java Servlets , JSP and Java beans. The main emphasis of this course is to develop projects using the advanced java concepts.

**UNIT - I**

**Windows-based Application:** An Overview of the Swing, features of Swing, Creating a Desktop application using Swing, Implementing the JFrame class, Using the JButton class, JLabel, JTextField classes, JTextArea classes, JTable class, JTabbedPane class.

**Implementing the Layout Managers:** The Flow Layout Manager, Border Layout manager, Grid Layout, Manager, Card Layout Manager and GridBag Layout manager. (9)

**UNIT- II**

**Java Database Programming:** Introducing JDBC, Exploring JDBC drivers, Exploring features of JDBC- Exploring Major classes and Interfaces.

**Exploring JDBC Process with java.sql package.** (10)

**UNIT – III**

**Servlet Programming:** Introducing Servlet, Features of java servlets, Exploring servlet API, Servlet Life cycle, configuring Servlet in web.xml, working with ServletConfig and ServletContext Objects, Creating a Simple servlet, working with the HttpServletRequest, HttpServletResponse Interfaces, Describing Request Delegation and Request Scope. (9)

**UNIT - IV**

**Java server Pages:** Understanding JSP, JSP Life Cycle, Creating simple JSP pages. JSP Basic Tags and Implicit Objects- Exploring Scripting elements, Exploring Implicit Objects, Exploring Directive Elements. (8)

**UNIT - V**

**JavaBeans and Action Tags in JSP:** Understanding JavaBean, Advantages of using JavaBeans, Action Tags.

**JSP Standard Tag Library(JSTL):** Describing JSTL Core Tags, Describing JSTL SQL Tags, Describing JSTL Formatting Tags, JSTL XML Tags. (9)

**Text Books:**

1. Java 6 and J2EE 1.5 Black Book by Kogent Learning Solutions Inc ., Dreamtech Press, 2011.

**Reference Book:**

1. Head First Servlet and JSP by Bryan Basham, Kathy Sierra and Bert Bates, Oreilly Publications, 2<sup>nd</sup> edition, 2012.

2. J2EE Complete Reference by Jim Keogh, TMH Publications, 2012.

**BCA – V SEMESTER  
GENERIC ELECTIVE - II  
SCS 343: .NET PROGRAMMING**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals:40 Marks

**Objective:** The objective of this course is to make the student learn .Net framework, working with windows web form and controls.

**UNIT - I**

**Introduction to .Net:** .Net Framework - Features and Architecture, Common Language Runtime, Common Type System, MSIL, Assemblies and Evolution of .Net, Class Libraries. (10)

**UNIT - II**

**Control Statements:** Control statements, Tools, Operators, Decision making statements, Loops, Sub procedures and functions scope. (8)

**UNIT - III**

**Windows forms:** Adding controls to forms, Buttons, Textbox, Checkbox, Label-Link Label, Panel, Group Box, Combo Box, Picture Box, Splitters, Timers-List Box, Scroll Bars, Other Tools And Tool Tips, Handling Controls with Events. (10)

**UNIT - IV**

**Classes and Objects:** Fields, Properties, Methods And Events, Class Vs. Object Members, Abstraction, Encapsulation, Inheritance, Polymorphism, Overloading, Overriding and Shadowing, Constructor and Destructor-Access Modifiers, Graphics and File Handling. (10)

**UNIT - V**

**Working with Web Forms and Controls:** Adding controls to a web application, Running a web application, web forms and HTML, Creating the web controls, Handling Client Events, Validation controls, HTML controls, Accessing data with server explorer, Working with ADO .Net objects, Binding controls to databases, Handling databases in code. (12)

**Text Books:**

1. Visual basic .Net programming black book by Steven Holzner, Dream Tech Press, 2006.

**Reference Books:**

1. Programming in Visual Basic by P K.M C Bride BPB Publications, 2002.

3. Visual Basic 6.0 from the ground up by Gary Cornell, Tata McGraw Hill, 28<sup>th</sup> reprint, 2008.

**BCA – V SEMESTER**  
**GENERIC ELECTIVE - II**  
**SCS 345: FINANCIAL ACCOUNTING AND ANALYSIS**

Hours per week: 4

End Examination: 60 Marks

Credits: 4

Sessionals: 40 Marks

**Objective:** To familiarize students with the concepts, tools and practices of financial management. To understand the decisions to be taken by financial managers of business firms.

**UNIT - I**

**Introduction to Accounting:** Objectives, Structure, Need for Accounting, Definition of accounting, Purpose of accounting, Limitations of Accounting, Branches of accounting, Book-keeping Vs. Accounting, Functions of Accounting, Advantages of Accounting. (9)

**UNIT - II**

**Accounting process:** Accounting Cycle, Journal, Ledger, Subsidiary Books, Cash book, Single Entry Book Keeping, Two Columns Cash book, Three Columns Cash Book, Bank Reconciliation Statements, Posting and preparation of Trial Balance. (10)

**UNIT - III**

**Final Accounts:** Trading Account, Profit and Loss Account, Balance sheet including Adjustments, Preparation of Final Accounts Problems. (10)

**UNIT - IV**

**Ratio Analysis:** Introduction, Ratio Analysis and Marginal Costing, Variable cost and Fixed cost, Cost-Volume-Profit Analysis, Calculation of Break-even Planning, Sales Planning and other decisions, Making Analysis involving Break-even. (9)

**UNIT - V**

**Budgeting:** Cash Budget, Sales Budget, Flexible Budgets, Master Budgets, Capital budget and Production Budget.

**Introduction to Computerized Accounting System:** Coding logic and codes, Master files, Transaction files, Introduction documents used for data collections, Processing of different files and outputs obtained. (12)

**Text Books:**

1. Principles of Accountancy by R.L. Gupta and V.K. Gupta, Sultan Chand & Sons, 1<sup>st</sup> edition, 2004. (UNIT I, UNIT II, UNIT III)
2. Financial Accounting and Analysis by P.Premchand Babu and M. Madana Mohan, Revised edition 2010. (UNIT IV, UNIT V).

**Reference Books:**

1. Fundamentals of Accounting & Financial Analysis by Anil Chowdhry, Pearson Education.
2. Accounting Made Easy by Rajesh Agarwal and R Srinivasan, Tata McGraw –Hill.
3. Financial Accounting For Management by S. N. Maheshwari, Vikas Publishing House.
4. An Introduction to Accountancy by Maheshwari, S.N. and Maheshwari, S. K., Vikas Publishing House, 8th edition, 2009.

**BCA – V SEMESTER**  
**SCS 321: BUSINESS INTELLIGENCE LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

1. Introduction, Basics, Code Editors for R.
2. R Programs using Comparison, Logical Operators.
3. R Programs using If, If-else Statements.
4. R Programs using For loop.
5. R Programs using While loop.
6. R Programs using Two Dimensional Data Sets.
7. R Programs using Ragged Arrays.
8. R Programs using Vectors and Lists.
9. R programs using Functions.
10. R Programs using Regular Expressions.
11. R Programs using Time, Date and Sleep.
12. R Programs using Sequence Analysis Utilities.
13. R Programs using Pattern Matching and Positional Parsing of sequences.
14. R Program to translate DNA into Protein.

**Reference Books:**

1. R Cook Book by Paul Teetor, Orielly Publications, 2011.

**BCA – V SEMESTER**  
**GENERIC ELECTIVE – II LAB**  
**SCS 381: ADVANCED JAVA PROGRAMMING LAB**

Hours per week: 3

Examination: 100 Marks

Credits: 2

**Objective:** The objective of this lab is to make the student learn the advanced concepts of java like servelets, JSP and JSTL tags.

1. Write and run a Servlet program that interacts with HTML page.
2. Program on JDBC for creation,insertion, deletion, updation of data in the database.
3. Program for Multiple Insertions, Multiple Deletions, Multiple Updatons of data in the database.
4. Program on Prepared Statement and Callable Statements.
5. Program to create a login page using HTML and check the Database values in Servlet using JDBC.
6. Program to create a Filter in Servlets.
7. Program to create a session in Servlets.
8. Program to print prime number in JSP.
9. Web Page Creation using JSP.
10. JSP Pages involves JDBC Connectivity.
11. Program to create a login page using JSP and check the values of Database in Servlets using JDBC.
12. Program to demonstrate entity bean
13. Program to demonstrate session bean.
14. Program on JSTL core tags.

**Reference Books:**

1. Java 6 and J2EE 1.5 Black Book by Kogent Learning Solutions Inc., Dreamtech Press, 2011.
2. Head First Servlet and JSP by Bryan Basham, Kathy Sierra and Bert Bates, Oreilly Publications, 2<sup>nd</sup> edition, 2012.
3. J2EE Complete Reference by Jim Keogh, TMH Publications, 2012.

**BCA – V SEMESTER  
GENERIC ELECTIVE – II LAB  
SCS 383: .NET PROGRAMMING LAB**

Hours per week: 3

Examination: 100 Marks

Credits: 2

1. Building simple applications using console applications.
2. Working with the controls in the tool box in windows applications.
3. Develop an application with multiple forms.
4. Develop an application with dialogues.
5. Create an application using menus.
6. Implement an application using data control.
7. Working with Intrinsic controls and ActiveX controls.
8. Application using format dialogues.
9. Drag and Drop events on the tools.
10. Implementation of Validation controls.
11. Database Management (ADO.Net).
12. Creating ActiveX controls.
13. Designing a sample project by incorporating all the concepts.

**Reference Book:**

1. Visual basic .Net programming black book, Steven Holzner, Dream Tech Press, 2006.

**BCA – V SEMESTER**  
**GENERIC ELECTIVE – II LAB**  
**SCS 585: FINANCIAL ACCOUNTING AND ANALYSIS LAB**

Hours per week: 3  
Credits: 2

Examination: 100 Marks

Students are trained on the topics discussed in the theory course using a financial Package.



**BCA – VI SEMESTER  
SCS 392: PROJECT WORK**

Credits: 8

End Examination: 50 Marks  
Sessionals: 150 Marks

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