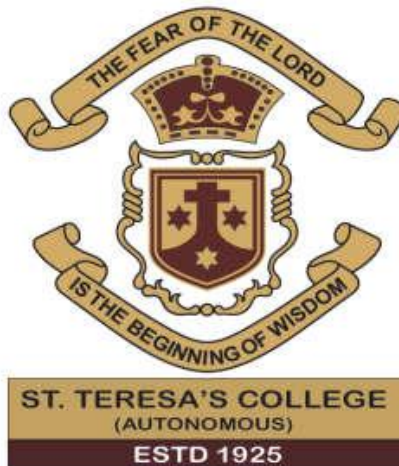


**ST.TERESA'S COLLEGE (AUTONOMOUS)**

**ERNAKULAM**

**(Affiliated to Mahatma Gandhi University, Kottayam)**



**CURRICULUM AND SYLLABI FOR  
BACHELOR'S PROGRAMME IN  
COMPUTER APPLICATIONS –  
CLOUD TECHNOLOGY AND  
INFORMATION SECURITY MANAGEMENT**

Under Choice Based Credit & Semester System

**(2018 Admissions)**

**St. Teresa’s College, (Autonomous)**  
**Department of Computer Applications**  
**Board of Studies in Computer Applications**

<b>Sl No.</b>	<b>Name of the member</b>	<b>Official Address</b>	<b>Designation</b>
1.	Dr. Sabu M K	Associate Professor, Department of Computer Applications, Cochin University of Science and Technology Cochin -22	Chairman
2.	Dr. B Kannan	Head Of the Department, Department of Computer Applications, Cochin University of Science and Technology Cochin -22	Subject Expert (Computer)
3.	Dr.Mary George	Assistant Professor, Department of Mathematics St.Aloysious College, Edathua	Subject Expert (Mathematics)
4.	Dr.Angel Mathew	Associate Professor, Department of Statistics Maharajas College, Ernakulam	Subject Expert (Statistics)
5.	Mr.K R Remesh Babu	Assistant Professor Department of Information Technology Government Engineering College Idukki	Subject Expert (Computer- Cloud Technology)
6.	Mr.Saj Janin J	Principal Architect Cognizant Technology Solution Kochi	Expert from the Industry
7.	Mrs. Sebby K X	Sr. HSST EMGHS, FortKochi	Alumnus
8.	Mrs.Sheeba Emmanuel	Assistant Professor, Department of Computer Applications, St.Teresa’s College,Ernakulam	Member
9.	Mrs.Dhanya R	HOD, Assistant Professor, Department of Computer Applications, St.Teresa’s College,Ernakulam	Member
10.	Ms.Sangeetha Chandran	Assistant Professor, Department of Computer Applications, St.Teresa’s College,Ernakulam	Member

Bachelor in Computer Applications – Cloud Technology and Information Security ,  
St. Teresa's College (Autonomous), Ernakulam

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<b>Sl No.</b>	<b>Name of the member</b>	<b>Official Address</b>	<b>Designation</b>
11.	Mrs.Nunuz Joseph	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
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13.	Mrs Laya Joseph M	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
14.	Mrs Alia Teresa TM	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
15.	Mrs.Kalpana C	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
16.	Mrs.Mekha Jose	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
17.	Mrs Archana Menon P	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
18.	Ms.Mahima Mary Mathews	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
19.	Ms. Christina Rajan Thomas	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member
20.	Mrs.Annie Merlyn Rodrigues	Assistant Professor, Department of Computer Applications, St.Teresa's College,Ernakulam	Member

## **FOREWORD**

Autonomy in the field of higher education implies responsibility and accountability and this in turn leads to excellence in academics and pro-active governance. St Teresa’s College was given autonomous status in the year 2014 and we have made a concerted attempt to maintain a high level of quality in the standard of education that we impart.

Academic autonomy has granted us the freedom to fine tune the syllabus keeping in mind the changing needs of the new generation of students. Education in the current scenario throws up a multitude of challenges and the curricula and syllabi ought to reflect the paradigm shift that has occurred in the various disciplines. Structured feedback was taken from the Students, Alumni and the experts from the industry and the changes suggested by them were duly incorporated in the syllabi.

The Board of Studies constituted for each department meet regularly in the stipulated time frame and in depth discussions are conducted about the different dimensions of the curricula and syllabi. The IQAC team has felicitated the conduct of a number of workshops and conferences to equip the faculty with the necessary skill set to frame the syllabi, set question papers for internal tests that evaluate whether the learning outcomes enlisted in the syllabus have been achieved and to ensure the fair and transparent conduct of examinations.

The responsibility that autonomy has placed on us is indeed onerous but we have strived together to meet all the challenges that were placed in our way. We have worked towards molding young women as responsible citizens who will carry forward the task of nation building in an exemplary manner. All effort has been made to nurture their academic ambitions as well as their skills in co-curricular activities.

With sincere gratitude I acknowledge the instinct support and constant guidance extended by Rev. Sr. Dr. Vinitha, the Director of the College.

I specially thank the team headed by Smt. Shanty B. P. for updating the syllabi, the Heads of the Departments and all the faculty members for their diligence, commitment and exceptional contribution towards this endeavor.

*Dr. Sajimol Augustine M.*  
Principal, St.Teresa’s College (Autonomous)

## **PREFACE**

As an autonomous college under Mahatma Gandhi University, St. Teresa’s College has taken conscientious efforts to strengthen the curriculum by retaining all the fundamental stipulations of the University/Higher Education Council, to ensure a well-balanced Curriculum. Within the constraints of a prescribed syllabus, we have resolved to take a collective effort to create an inspiring academic culture in the institution, essential for teachers and students to access deeper knowledge and participate in its expansion and transmission. It is also to re-articulate the almost lost or forgotten fact that production and transmission of Quality Knowledge, essential for the development of students in particular and society in general, are the primary functions of any Educational Institution.

The Syllabus restructuring of 2018 aims to provide the students many opportunities to engage with authentic, real world learning. This has been evident through the significant number of new Programmes introduced at the wake of autonomy in 2014 with their integral placement opportunities. Increasingly, however, opportunities for engagement in work-based learning that can be provided through the curriculum across a range of subject areas are creating new and exciting ways to support student learning.

I acknowledge the efforts taken by the teachers in developing Programme and Course outcomes that focus on cognitive and intellectual skills of the learners ,confidence to carry out independent and scholarly research in area of professional interest to them and to position themselves globally effective cross- cultural educators .

I congratulate the efforts taken by the Principal Dr. Sajimol Augustine M. and the team for restructuring the syllabi under the leadership of Smt. Shanty B.P in a meaningful manner. Transformation is what makes St. Teresa’s distinctive. Transforming lives in order to make a real impact on the local and international stage through the creation, sharing and application of knowledge. We look forward to sharing with you the outcomes of our curriculum restructuring and these resources we hope will enable you to reflect on learning gain in our own institution.

*Dr. Sr. Vinitha (Celine E)*

Director

## ACKNOWLEDGEMENT

The syllabus restructuring of the BCA-Cloud Technology & Information Security Management programme would not have been possible without the guidance and the help of several individuals who in one way or other contributed and extended their valuable assistance in the preparation and completion of this work.

The Board of Studies in Department of Computer Applications takes this opportunity to express our deep appreciation to all academicians and professionals who participate in the workshops organized by St. Teresa's College (Autonomous) for restructuring the UG Course in Department of Computer Applications (BCA- CT & ISM). I remember with gratitude the support of our Director, Rev. (Dr). Sr. Vinitha, Principal, Dr. Sajimol Augustine. M, Prof. Jogy Alex, Dept. of Chemistry, St. Thomas College, Pala and the members of syllabus revision committee during the syllabus restructuring process.

I am grateful to the Board of Studies members of the Department of Computer Applications for their valuable insights and guidance throughout the process.

I am indebted to the faculties of Department of Computer Applications for their kind co-operation in all phases of this syllabus restructuring process.

We place on record our gratitude to the Syllabus Restructuring committee headed by Smt. Shanty B P, Assistant Professor of Department of Statistics, for the timely and valuable guidance. We express our whole- hearted gratitude to all those who have helped us in this endeavor.

**Dr.Sabu M K**

Chairman, Board of Studies

Department of Computer Applications

## CONTENTS

	Page No.
Preamble	8
Graduate attributes	9
Aims and Objectives	10
Programme Design	14
Course Code Format	16
<b>Programme Structure</b>	
Programme Structure - BCA- CT & ISM	18
Scheme- BCA-CT & ISM	22
Examinations	25
<b>Syllabus</b>	
BCA- CT & ISM Core Courses	30
Environmental Studies	100
BCA- CT & ISM Open Courses	130
BCA- CT & ISM Choice Based Courses	137
BCA- CT & ISM Complementary Courses	150
<b>Model Question Papers</b>	
BCA- CT & ISM Core Courses	34
BCA- CT & ISM Complementary Courses	153

**BACHELOR OF COMPUTER APPLICATIONS**  
**[Specialization in Cloud Technology and Information Security]**

**Preamble**

The Computer Department of St. Teresa’s College is proposed to start a new course on Dual Specialization in Cloud Technology and Information Security Management. As St.Teresa’s College is granted academic autonomy in the year 2014, hence it has the privilege of restructuring the syllabus. Keeping an eye on the industry and to modernize the curriculum, the Board of Studies members of the Department of Computer Applications, St.Terasas College, has initiated an industry collaboration to impart Bachelor of Computer Applications (dual specialization) programme in Cloud Technology and Information Security Management.

The main objective of this program is to inculcate among the students, the technical as well as the theoretical knowledge about the computers and its various applications in different fields. This program is designed in such a way that students can have a detailed knowledge of subjects as well as the knowledge of IT related applications. Throughout this program the students will go through the IT scenario, its scope, career and the essentials of the IT world.

This unique course provides dual career options for the students in the latest and fast growing technology sectors of Cloud Technology and Information Security.

The syllabus aims to focus on enabling the students to familiarize with the new technologies, and at the same time enhance and strengthen the fundamental knowledge in Computer Applications, Mathematics, and Statistics.



## Graduate Attributes

The Bachelor of Computer Applications (dual specialization) programme will equip the students with the necessary knowledge and skills for the existing and emerging challenges that a career in computing and software technology will entail. In addition it prepares graduates to show high quality of independent thought, flexibility and maturity based on a sound technical knowledge of the field.

Bachelor of Computer Applications (Dual Specialization) programme, will enable the student to embark on a successful career in the area of Cloud Technology and Information Security Management.

On completion of the Bachelor of Computer Applications in Cloud Technology and Information Security Management course students should be able to,

- Use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.
- Be able to understand, design, and analyze precise specifications of algorithms, procedures, and interaction behavior.
- Be able to apply mathematics, logic, and statistics to the design, development, and analysis of software systems.
- Be equipped with a range of fundamental principles of Computer Science that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.
- Be able to gain experience of working in teams to build software systems.
- Students will be able to gain a strong ground in basic discipline of study
- Students will be able to learn the practical implementation , as the learning of the practical subjects will happen in laboratories or on the field ,
- The student will be able to have an insight to the situations in the existing field/market/industries because of the project work.

## **AIMS AND OBJECTIVES**

This unique course provides dual career options for the students in the fast growing technology sectors of Cloud Technology and Information Security. In addition to all the mandatory subjects of a traditional BCA, this specialized course offers in-depth practical know-how of the current trend Technology – Cloud and Information Security. These sectors have the potential to grow exponentially and they provide challenging job opportunities for young professionals with the right skill sets.

On the Cloud Technology front, the course will provide students with the fundamental knowledge of all aspects of Cloud Technology. The course focuses on Virtualization Technology, Cloud Technology, Datacenters, Networking and Operating Systems. On the Information Security front, this course equips the students with the concepts and the technical skills in Information Security. The focus of the course is on the models, tools and techniques for enforcement of Security Policies, with emphasis on Cryptography, Ethical Hacking, Computer Forensics and Virtualization and Cloud Security.

### **At the end of first year (1st and 2nd Semester), the learner will be able to:**

- Understand the basic concepts and working of a Computer, the types of languages used, the organization and architecture of the components in a Computer, and the working of operating system.
- Discuss the features and functions of Linux Operating System.
- Understand the concepts behind programming in C and C++, and develop simple to complex programs.
- Compare the different types of data structures and develop programs to search and sort for elements.

### **At the end of second year (3rd and 4th Semester), the learner will be able to:**

- Understand software development and the concepts behind Java programming, and develop simple to complex programs.
- Discuss how to provide protection for information, how to manage data using a database, how to perform ethical hacking and explain the different concepts in computer networks.
- Discuss fundamentals of cloud computing.
- Understand the concept of virtualization and different products for doing the same.

**At the end of third year (5th and 6th Semester), the learner will be able to:**

- Understand the basics of encryption and decryption techniques in Cryptography and also giving an idea of key management and distribution features..
- Discuss about how to provide security for mobile and wireless technology and understand computer forensics and investigation concepts.
- Understand how the different IT services can be provided with the help of Windows Azure.
- Discuss the administration of Linux server and understand how to configure and administer different services

**Career Opportunities for Cloud Technology Professionals**

**Global Scenario**

- Combined Market of Private and Public Cloud Services - \$11 Billion in 2012
  - Poised to grow to \$ 65 to 85\$ Billion in 2015
- McKinsey Analysis: Winning in the SMB Cloud: Charting a Path to Success

**Growth and Forecast**

- There are currently about 50 million enterprise users of Cloud Office Systems which represent only 8 percent of overall office system users, excluding China and India.
- Predicts that a major shift toward cloud office systems will begin by the first half of 2015 and reach 33 % penetration by 2017.

**- Gartner Report**

- Worldwide spending on public IT cloud services will be more than \$40 billion in 2014
- Expected to approach \$100 billion in 2016.
- Over the 2012–2016 forecast period, public IT cloud services will enjoy a compound annual growth rate (CAGR) of 26.4%, five times that of the IT industry overall

**- IDC research**

**Jobs and Opportunities - Global**

- Cloud Computing to Create 14 Million New Jobs by 2015.
- By 2015, business revenues from IT innovation enabled by the cloud could reach US\$1.1 trillion a year.

### Indian Scenario

#### Market Size - India

The public cloud services market in India is forecast to grow 36 percent in 2014 to total \$443 million, up from \$326 million in 2013, according to Gartner, Inc. Infrastructure as a service (IaaS), including cloud computing, storage and print services, continues as the fastest-growing segment of the market in India, growing 22.7 percent in 2013 to \$43.1 million, and it is expected to grow 39.6 percent in 2014 to \$60.2 million. Infrastructure as a service (IaaS), including cloud compute, storage and print services continued as the fastest-growing segment of the market, growing 42.4 percent in 2012 to \$6.1 billion and expected to grow 47.3 percent in 2013 to \$9 billion.

#### Jobs and Opportunities - India

India will create over 2 million jobs in Cloud sector, predicts a study commissioned by Microsoft and conducted by International Data Corporation (IDC).

#### Career Progression Path - Cloud Technology

Industry	Entry level (0-1 yrs exp.)	Mid Level (3-5 yrs exp.)	Advanced level (5 yrs plus exp.)
<b>Job Role</b>	Cloud Architect		Cloud Consultant
	Cloud Engineer	Sr. Cloud Engineer Manager Cloud Technology	Manager Cloud Technology
	Datacenter Technician	Datacenter Engineer	Datacenter Manager
	Remote Desktop Engineer	Cloud Provisioning Engineer	Datacenter Manager
	Cloud Security Specialist	Security Engineer	Manager Cloud Security

**Job Opportunity for Cyber Security in various departments of different sectors:**

- Corporate (Information Security, Compliance, IT&IS Audit, Software Development etc.)
- Banking, Finance and Insurance Sector (IT and Data Security, E-Commerce and Net-banking Security, Compliance, Information Risk Management, IT&IS Audit etc.)
- Defense and Police (R&D, Investigation and Forensics, IT Infrastructure Security etc.)
- Governance (E-Governance, Public Key Infrastructure Management, Forensic Science Labs etc.)
- Legal Department (Cyber Forensics Consultants, Cyber Law Expert, Expert witness etc.)
- Cyber Fraud Consultants / Management (Ethical Hacker, Penetration Testers, Cyber Fraud Detectives)

**Career Progression Path – Information Security**

<b>Industry</b>	<b>Entry level (0-1 yrs exp.)</b>	<b>Mid Level (3-5 yrs exp.)</b>	<b>Advanced level (5 yrs plus exp.)</b>
<b>Job Role</b>	Executive Information Security	Sr. Information Security Officer	Chief Information Security Officer
	Malware Analyst	Sr. Malware Analyst	Manager Anti Virus Development
	Datacenter Technician	Datacenter Engineer	Datacenter Manager
	Junior Penetration Tester	Penetration Tester	Ethical Hacker
	Database Manager – IT Security	Network and Database Manager - IT Security	Datacenter Security Engineer
	Junior Cyber Forensic Analyst	Cyber Forensic Analyst	Cyber Forensic Investigator

## **PROGRAMME DESIGN**

The B.C.A in Cloud Technology and Information Security Management includes,

- a. Common Courses
- b. Core Courses
- c. Choice Based Core Courses
- d. Complementary Courses
- e. Open Courses
- f. Seminar
- g. Project
- h. Viva Voce.

No course shall carry more than 4 credits except Project. The student shall select any Choice based core course offered by the department which offers the core courses, depending on the availability of teachers and infrastructure facilities, in the institution. Open course shall be offered in any subject and the student shall have the option to do courses offered by other departments.

## **PROGRAMME STRUCTURE**

### **BCA- CLOUD TECHNOLOGY & INFORMATION SECURITY MANAGEMENT**

A	Programme Duration	6 Semesters
B	Total Credits required for successful completion of the Programme	120
C	Credits required from Open Course	3
D	Credits required from Seminar	2
E	Credits required from Project	3
F	Credits required from Viva Voce	1
G	Minimum attendance required	75%

## COURSES

The Programme consists of common courses with 8 credits, core course, Choice based core course, and complementary courses with 109 credits and open course with 3 credits.

## SCHEMES OF COURSES

The different types of courses and its number is as follows:

S.No	Category	No. of Papers	Credits
1	Common Courses	2	08
2	Core Courses	28	92
3	Choice Based Core Courses	1	04
4	Complementary Courses	2	07
5	Open Courses	1	03
6	Seminar	1	02
7	Project	1	03
8	Viva Voce	1	01
<b>Grand Total</b>		<b>37</b>	<b>120</b>

### Open Course

- All students are expected to do the open course in fifth semester. The students can opt from the courses offered by any discipline other than their own core discipline.

The Department of Computer Applications (BCA- CT & ISM) is offering two open courses “*Security Threats and Trends*” and “*Hactivism, Cyberwarfare and Cyberterrorism*”, with 3 credits. This course is for other Department Students.

### Choice Based Core Course

The Department of Computer Applications (BCA- CT & ISM) is offering four choice based core courses;

- Virtualization and Cloud Security
  - Cloud Web Services
  - Fundamentals of Data Center
  - Fundamentals of ITIL
- } Semester 6

### **Seminar**

Each student can choose a latest topic of current day interest in the areas of Computer Science / Information Technology and present a seminar presentation using appropriate presentation media.

### **Project**

All students are to do a project. This project can be done individually. The projects are to be identified during the 5<sup>th</sup> semester of the programme with the help of the supervising teacher. The project evaluation will be carried out in the sixth semester.

### **COURSE CODE FORMAT**

The programme is coded according to the following criteria.

1. The first 3 letters from the name of the programme i.e., **BCA**
2. One digit to indicate the semester. i.e., **BCA1 (BCA, 1<sup>st</sup> semester)**
3. One letter from the type of courses such as, **A** for common course, **B** for core course, **C** for Complementary course, **D** for Open course, i.e., **BCA1B (BCA, 1<sup>st</sup> semester Core course)** and **P** for project.
4. Two digits to indicate the course number of that semester. i.e., **BCA1B01 (BCA, 1<sup>st</sup> semester, Core course, course number is 01)**
5. The letter **B** to indicate Bachelors Programme. (**BCA1B01B (BCA, 1<sup>st</sup> semester, Core course, courses number 01, and B for bachelors Programme)**)
6. **18** to indicate the **year**. i.e., **BCA1B01B18**



### **DURATION OF PROGRAMME**

- The duration of U.G. Programmes shall be **6 semesters**.
- A student may be permitted to complete the programme, on valid reasons, within a period of 12 continuous semesters from the date of commencement of the first semester of the programme.
- Attendance: Students having a minimum of 75% average attendance for all the courses only, can register for the examination.

**PROGRAMME STRUCTURE**

**BCA – Cloud Technology and Information Security Management**

Semester	Course Code	Title of the Course	No.of Hrs/ Week	Credits	Total Hrs/ Sem	Exam Duration	Total Marks	
							ISA	ESA
1	EN1A01B18	Fine-tune Your English	5	04	90	3	20	80
	BCA1B01B18	Computer fundamentals & organization	4	04	72	3	20	80
	BCA1B02B18	Programming in C	4	03	72	3	20	80
	BCA1B03B18	Introduction to Unix and Shell Scripting	4	03	72	3	20	80
	BCA1BP01B18	Software Lab- I	4	02	72	3	20	80
	ST1C01B18	Descriptive Statistics	4	03	72	3	20	80
	TOTAL HOURS AND CREDIT			25	19			
2	EN2A03B18	Issues that Matter	5	04	90	3	20	80
	BCA2B04B18	Operating system	4	04	72	3	20	80
	BCA2B05B18	OOPS with C++	4	03	72	3	20	80
	BCA2B06B18	Data structures using C	4	03	72	3	20	80
	BCA2BP02B18	Software Lab-II	4	02	72	3	20	80
	MT2C04B18	Fundamentals of mathematics	4	04	72	3	20	80
	TOTAL HOURS AND CREDIT			25	20			

Bachelor in Computer Applications – Cloud Technology and Information Security ,  
St. Teresa's College (Autonomous), Ernakulam

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3	BCA3B07B18	Information security fundamentals	4	04	72	3	20	80
	BCA3B08B18	Software Engineering	4	04	72	3	20	80
	BCA3B09B18	Computer networks	4	04	72	3	20	80
	BCA3B10B18	RDBMS	4	03	72	3	20	80
	BCA3B11B18	Programming in Java	4	03	72	3	20	80
	BCA3BP03B18	Software lab-III	5	02	90	3	20	80
	TOTAL HOURS AND CREDIT			25	20			
4	BCA4B12B18	Basics of Server Operating System	4	04	72	3	20	80
	BCA4B13B18	Database Security Fundamentals	4	04	72	3	20	80
	BCA4B14B18	Principles of Virtualization	4	04	72	3	20	80
	BCA4B15B18	Introduction to Cloud Technology	4	03	72	3	20	80
	BCA4B16B18	Ethical Hacking Fundamentals	4	03	72	3	20	80
	BCA4BP04B18	Software Lab – IV	5	02	90	3	20	80
	TOTAL HOURS AND CREDIT			25	20			
5	BCA5B17B18	IT, Environment & Human Rights	4	04	72	3	20	80
	BCA5B18B18	Cryptography Fundamentals	4	04	72	3	20	80

Bachelor in Computer Applications – Cloud Technology and Information Security ,  
St. Teresa’s College (Autonomous), Ernakulam

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	BCA5B19B18	Computer Forensics and Investigation Management	4	03	72	3	20	80
	BCA5B20B18	Linux Administration	4	03	72	3	20	80
	BCA5D01aB18/ BCA5D01bB18	Open Course (Course Offered by other Departments)	4	03	72	3	20	80
	BCA5BP05B18	Software Lab – V	5	02	90	3	20	80
	TOTAL HOURS AND CREDIT		25	19				
6	BCA6B21B18	IT Governance, Risk, & Information Security Management	4	04	72	3	20	80
	BCA6B22B18	Mobile, Wireless and VOIP Security	4	04	72	3	20	80
	BCA6B23B18	Introduction to Windows Azure	4	04	72	3	20	80
	BCA6B24aB18/ BCA6B24bB18/ BCA6B24cB18/ BCA6B24dB18	Choice Based Core Course	4	04	72	3	20	80
	BCA6BSB18	Seminar	2	2	36		20	80
	BCA6BPRB18	Project	7	3	126	3	20	80
	BCA6BVB18	Viva Voce		1				100
	TOTAL HOURS AND CREDIT		25	22				
	<b>Total Credits</b>		<b>120</b>					

**List of Open Course subjects –**

1. BCA5D01aB18 - Security Threats and Trends
2. BCA5D01bB18 - Hacktivism, Cyberwarfare and Cyberterrorism

**Choice Based Core Course Subjects:-**

1. BCA6B24aB18 - Virtualization and cloud Security
2. BCA6B24bB18 - Cloud Web Services
3. BCA6B24cB18 - Fundamentals of Data center
4. BCA6B24dB18 - Fundamentals of ITIL

**CONSOLIDATED SCHEME - I to VI SEMESTERS PROGRAMME STRUCTURE**

**BCA – Cloud Technology and Information Security Management**

Sl. No	Category	Semester	Course Code	Name of the Subject	Credits
1	Common	Semester 1	EN1A01B18	Fine-tune Your English	04
2	Core		BCA1B01B18	Computer fundamentals & organization	04
3	Core		BCA1B02B18	Programming in C	03
4	Core		BCA1B03B18	Introduction to Unix and Shell Scripting	03
5	Core		BCA1BP01B18	Software Lab-I	02
6	Complementary		ST1C01B18	Descriptive Statistics	03
				<b>Total Credits</b>	<b>19</b>
7	Common	Semester 2	EN2A03B18	Issues that Matter	04
8	Core		BCA2B04B18	Operating system	04
9	Core		BCA2B05B18	OOPS with C++	03
10	Core		BCA2B06B18	Data structures using C	03
11	Core		BCA2BP02B18	Software lab-II	02
12	Complementary		MT2C04B18	Fundamentals of mathematics	04
				<b>Total Credits</b>	<b>20</b>
13	Core	Semester 3	BCA3B07B18	Information Security Fundamentals	04
14	Core		BCA3B08B18	Software Engineering	04
15	Core		BCA3B09B18	Computer Networks	04

Bachelor in Computer Applications – Cloud Technology and Information Security ,  
St. Teresa's College (Autonomous), Ernakulam

16	Core		BCA3B10B18	RDBMS	03
17	Core		BCA3B11B18	Programming in Java	03
18	Core		BCA3BP03B18	Software Lab III	02
				<b>Total Credits</b>	<b>20</b>
19	Core	<b>Semester 4</b>	BCA4B12B18	Basics of Server Operating System	04
20	Core		BCA4B13B18	Database Security Fundamentals	04
21	Core		BCA4B14B18	Principles of Virtualization	04
22	Core		BCA4B15B18	Introduction to Cloud Technology	03
23	Core		BCA4B16B18	Ethical Hacking Fundamentals	03
24	Core		BCA4BP04B18	Software Lab-IV	02
				<b>Total Credits</b>	<b>20</b>
25	Core	<b>Semester 5</b>	BCA5B17B18	IT, Environment & Human Rights	04
26	Core		BCA5B18B18	Cryptography Fundamentals	04
27	Core		BCA5B19B18	Computer Forensics and Investigation	03
28	Core		BCA5B20B18	Linux Administration	03
29	Core (Open Course)		BCA5D01aB18	Security Threats and Trends	03
			BCA5D01bB18	Hactivism, Cyberwarfare and Cyberterrorism	
30	Core	BCA5BP05B18	Software Lab-V	02	
				<b>Total Credits</b>	<b>19</b>

31	Core	<b>Semester 6</b>	BCA6B21B18	IT Governance, Risk, & Information Security Management	04
32	Core		BCA6B22B18	Mobile, Wireless and VOIP Security	04
33	Core		BCA6B23B18	Introduction to Windows Azure	04
34	Core (Choice Based)		BCA6B24aB18	Virtualization and Cloud Security	04
			BCA6B24bB18	Cloud Web Services	
			BCA6B24cB18	Fundamentals of Datacenter	
			BCA6B24dB18	Fundamentals of ITIL	
35	Core		BCA6BSB18	Seminar	02
36	Core		BCA6BPRB18	Project	03
37	Core		BCA6BVB18	Viva voce	01
				<b>Total Credits</b>	<b>22</b>

### OPEN COURSES

Sl No.	Semester	Course Code	Course Title
1	V	BCA5D01aB18	Security Threats and Trends
2	V	BCA5D01bB18	Hackivism, Cyberwarfare and Cyberterrorism

### CHOICE BASED COURSES

Sl No.	Semester	Course Code	Course Title
1	VI	BCA6B24aB18	Virtualization and Cloud Security
2	VI	BCA6B24bB18	Cloud Web Services
3	VI	BCA6B24cB18	Fundamentals of Datacenter
4	VI	BCA6B24dB18	Fundamentals of ITIL



## EXAMINATIONS

The external theory examination of all semesters shall be conducted by the College at the end of each semester. Internal evaluation is to be done by continuous assessment.

Examinations have two parts: Internal or In-Semester Assessment (ISA) & External or End–Semester Assessment (ESA). The ratio between ISA and ESA shall be 1:4. Both internal and external marks are to be rounded to the next integer.

## MARKS DISTRIBUTION FOR ESA AND ISA

Marks distribution for ESA and ISA and the components for evaluation with their marks are shown below:

### For all courses without practical

- a) External examination: 80 marks
- b) Internal evaluation: 20 marks

<b>Internal assessment components - Theory</b>	<b>Marks</b>
<b>Attendance</b>	<b>5</b>
<b>Assignment/Seminar/Viva</b>	<b>5</b>
<b>Test papers (2 x 5)</b>	<b>10</b>
<b>Total</b>	<b>20</b>

**FOR ALL PRACTICAL PAPERS**

**(a) Marks of external Examination : 80**

**(b) Marks of internal evaluation : 20**

<b>Internal assessment components</b>	<b>Marks</b>
<b>Attendance</b>	<b>3</b>
<b>Test paper</b>	<b>10</b>
<b>Record*</b>	<b>5</b>
<b>Lab Involvement</b>	<b>2</b>
<b>Total</b>	<b>20</b>

\*Marks awarded for Record should be related to number of experiments recorded

**FOR PROJECTS/ SEMINAR/ INDUSTRIAL VISIT AND COMPREHENSIVE  
VIVA- VOCE\*:**

**(a) Marks of external Examination : 80**

**(b) Marks of internal evaluation : 20**

<b>Components of External Evaluation of Project</b>	<b>Marks</b>
Demonstration and Presentation	40
Project Viva	20
Project Report	20
<b>Total</b>	<b>80</b>

\* Bonafide reports of the project work or Industrial Visit conducted shall be submitted at the time of examination.

## PATTERN OF QUESTION PAPERS

A question paper shall be a judicious mix of short answer type, short essay type/ problem solving type and long essay type questions.

For each course the End-semester Assessment is of 3 hours duration. The question paper has 3 parts. Part A contains 12 objective type questions of which 10 are to be answered .Part B contains 9 short essay questions of which 6 are to be answered. Part C has 4 long essay questions of which 2 are to be answered.

Part	No. of Questions	No. of questions to be answered	Marks(for courses without practical)
A(Short Answer type)	12	10	10 x 2 = 20
B(Short Essay)	9	6	6 x 5 = 30
C (Long Essay)	4	2	2 x 15 =30

## GRADE

A 7-point scale based on the total percentage of marks (ISA + ESA) for all courses (theory, practical, project)

% of marks	Grade	Grade point
>95	<b>S - Outstanding</b>	<b>10</b>
85 - 95	<b>A<sup>+</sup> - Excellent</b>	<b>9</b>
75 - 85	<b>A - Very good</b>	<b>8</b>
65 - 75	<b>B<sup>+</sup> - Good</b>	<b>7</b>
55 - 65	<b>B - Above average</b>	<b>6</b>
45 - 55	<b>C - Satisfactory</b>	<b>5</b>
35 - 45	<b>D - Pass</b>	<b>4</b>
<35	<b>F - Failure</b>	<b>0</b>
	<b>Ab - Absent</b>	<b>0</b>

**PASS CRITERIA:**

- A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 35% for a pass in a course
- For a pass in a programme, a separate minimum of Grade D is required for all the individual courses
- If a candidate secures F Grade for any one of the courses in a semester/programme, only F grade will be awarded for that semester/programme until he/she improves this to D Grade or above within the permitted period
- Students who complete the programme with D grade will have one betterment chance within 12 months, immediately after the publication of the result of the whole programme

**CREDIT POINT AND CREDIT POINT AVERAGE**

Credit Point (CP) of a course is calculated:

$$CP = C \times GP$$

C = Credit; GP = Grade point

Semester Grade Point Average (SGPA) of a semester:

$$SGPA = TCP/TC$$

TCP = Total Credit Point of that semester

TC = Total Credit of that semester

Cumulative Grade Point Average (CGPA) is calculated:

$$CGPA = TCP/TC$$

TCP = Total Credit Point of that programme

TC = Total Credit of that programme

**GRADE POINT AVERAGE (GPA)**

**GPA** of different category of courses viz. Common courses, Complementary courses, Core courses etc. are calculated:

$$GPA = TCP/TC$$

TCP = Total Credit Point of a category of course

TC = Total Credit of that category of course

Grades for the different courses, semesters and overall programme are given based on the corresponding GPA:

<b>GPA</b>	<b>Grade</b>
<b>&gt;9.5</b>	<b>S - Outstanding</b>
<b>8.5 – 9.5</b>	<b>A<sup>+</sup> - Excellent</b>
<b>7.5 – 8.5</b>	<b>A - Very good</b>
<b>6.5 – 7.5</b>	<b>B<sup>+</sup> - Good</b>
<b>5.5 – 6.5</b>	<b>B - Above average</b>
<b>4.5 – 5.5</b>	<b>C - Satisfactory</b>
<b>3.5 – 4.5</b>	<b>D - Pass</b>
<b>&lt;3.5</b>	<b>F - Failure</b>

- There shall be supplementary exams only for V sem
- For reappearance/improvement for other semesters, appear along with the next batch
- Notionally registered candidates can also apply for the said supplementary examinations
- A student who registers his name for the external exam for a sem will be eligible for promotion to the next semester
- A student who has completed the entire curriculum requirement, but could not register for the Semester examination can register notionally, for getting eligibility for promotion to the next semester
- A candidate who has not secured minimum marks/credits in internal examinations can re-do the same registering along with the University examination for the same semester, subsequently
- There shall be no improvement for internal evaluation

**SYLLABI**

**OF**

**CORE COURSES**

**Semester:** 1

**Course Code:** BCA1B01B18

**Name of the Course:** COMPUTER FUNDAMENTALS & ORGANIZATION

**Duration:** One Semester

**Credits:** 4

**Total Lecture Hours:** 72

**Aim of the course:**

To enable learners to understand the basics of computer organization, gain functional knowledge of the hardware used in computers and the basic knowledge of digital fundamentals, Microsoft office tools and networking

**Course Overview and Context:**

The knowledge of how a computer works is very important for any IT learner. This will build a basic understanding for learning core topics like networking, operating systems, etc.. The functional knowledge of a computer's working and its main building components are paramount. The computers of today may come with a variety of features, but the basic working principles will remain the same.

In this course, the learners will explore the fundamentals of organization of a computer and the principles and building Modules, i.e., its hardware. Also, the learners will be introduced to digital fundamentals, the different Microsoft Office tools and basic networking.

**Syllabus Content:**

**Module I:** (15 hrs)

**General features of a computer:** Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia.

**Module II:** (16 hrs)

**Computer organization:** central processing Module, computer memory – primary memory and secondary memory. Secondary storage devices – Magnetic and optical media. Input and output Modules. OMR, OCR, MICR, scanner, mouse, modem.

**Module III:** (16 hrs)

**Computer hardware and software:** Machine language and high level language. Application software, computer program, operating system. Computer virus, antivirus and computer security. Elements of MS DOS and Windows OS. Computer arithmetic, Binary, octal and hexadecimal number systems. Algorithm and flowcharts, illustrations, elements of a database and its applications. Basic Gates (Demorgans theorems, duality theorem, NOR,NAND,XOR,XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

**Module IV:** (10 hrs)

**MS Office:** Word processing and electronic spread sheet. An overview of MSWORD, MSEXCEL and MSPOWERPOINT

**Module V:** (15 hrs)

**Introduction to networking:** Network of computers. Types of networks, LAN, Intranet and Internet. Internet applications. World wide web, E-mail, browsing and searching, search engines, multimedia applications.

**Competencies of the course:**

- Understand the Organization of Computers
- Understand the PC Hardware Components
- Compare the different generations and features of computers
- Distinguish between computer hardware and software
- Identify different threats that violates computer security
- Recognise the different logical gates and their applications
- Identify how to create precise documents and PowerPoint presentations using Microsoft Office tools
- Understand the different types of networks
- Identify various internet applications
- Identify and list out the functionalities and features of different components of a computer.



**Text Books:**

- Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
- Jain, S K (1999) : Information Technology “O” level made simple, BPB Pub
- Jain V K (2000) “O” Level Personal Computer software, BPB Pub.

**Reference Books:**

- Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
- Hamacher, Computer Organization McGrawhill
- Alexis Leon: Computers for everyone. Vikas, UBS
- Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
- Sinha. Computer Fundamentals BPB Pub.

**BLUE PRINT**

**Code: BCA1B01B18**

**COURSE TITLE: COMPUTER FUNDAMENTALS & ORGANIZATION**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	15	2	2	1
II	16	3	2	1
III	16	3	2	1
IV	10	2	1	-
V	15	2	2	1

**BCA – CT&ISM (C.B.C.S.S) Examination**

**MODEL QUESTION PAPER**

**I SEMESTER - CORE**

**BCA1B01B18 : COMPUTER FUNDAMENTALS AND ORGANIZATION**

**Time : 3 Hrs**

**Maximum Marks : 80**

**PART A**

**(Answer any 10 questions. Each question carries 2 marks)**

1. What is a Computer?
2. What is Scale of Integration?
3. Give a note on ALU?
4. What is virtual memory?
5. Give the expansion of OCR and its purpose.
6. Name different types of hardware devices.
7. Define an algorithm with a simple example
8. Convert the binary whole number 110010 to its corresponding decimal number.
9. Write shortcut commands for copy and paste.
10. List any four characteristics of 'Microsoft Office 2013'.
11. What is Point-to-Point transmission?
12. Differentiate between internet and intranet.

**(10 x 2=20 marks)**

**PART B**

**(Answer any 6 questions. Each question carries 5 marks)**

13. Explain the overview of a computer system.
14. Explain in detail, the instruction steps to execute CPU cycle.
15. Write note on secondary storage devices.
16. What is RAID? Explain the RAID Levels.
17. Write a short note on Machine language with an example.
18. Briefly explain about 'Interpreters' and 'Assemblers'.
19. Explain the 'Security' feature in MS-Office.
20. Write a short note on search engines.

21. Explain DNS with example.

**(6x 5 = 30 marks)**

**PART C**

**(Answer any 2 questions. Each question carries 15 marks)**

22. Discuss the generations of computer with suitable examples.

23. Explain the memory Hierarchy.

24. What are Basic Gates? Explain with truth tables.

25. Explain different types of Networks along with their advantages and disadvantages.

**(2 x 15 = 30 marks)**

**Semester:** 1

**Course Code:** BCA1B02B18

**Name of the Course:** PROGRAMMING IN C

**Duration:** One Semester

**Credits:** 3

**Total Lecture Hours:** 72

**Aim of the course:**

To provide learners with an understanding of the different principles of programming with the language C. It will also enable them to design and implement procedural programming concepts.

**Course Overview and Context:**

Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments. The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX operating system. UNIX operating system, C compiler and all UNIX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms.

This course focuses on all the basic concepts, syntax and constructs of the C language. For learners, who are new to programming, this course can be considered as the starting point before taking up any other programming oriented courses.

**Syllabus Content:**

**Module I:** (10 hrs)

**Overview of Programming:** Introduction to computer based problem solving, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters.

**Module II:** (16 hrs)

**Fundamentals of C programming:** Overview of C, Data Types, Constants & Variables, Operators & Expressions, Control constructs-if then, for, while, Arrays- single &

multidimensional arrays, Functions-fundamentals – general form, function arguments, return value, Basic I/O-formatted and Unformatted I/O, Advanced features- Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, \* operator, Type casting, type conversion.

**Module III:** (16 hrs)

**Advanced programming techniques:** Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi.

**Module IV:** (15 hrs)

**Dynamic data structures in C:** Pointers- The & and \* operator, pointer expression, assignments, arithmetic, comparison, malloc vs calloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function returning pointers, Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, Unions – Declaration, uses, enumerated data-types, typedef.

**Module V:** (15 hrs)

**Additional features:** File Handling – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions.

**Competencies of the course:**

- Understand the features and characteristics of C language
- Discuss the basic elements of C, its features and characteristics, create algorithms and flowcharts
- Understand the working of different control flow statements, looping structures, etc.
- Recognise the use of different data types, operators and expressions.
- Understand the features and uses of arrays
- Understand the syntax of functions
- Discuss about recursion, iteration and different ways to pass arguments

- Understand how to implement functions, unions and structures for different programming assignments
- Understand pointers and function arguments
- Understand how to create files and manipulate them

**Text Books:**

- Let us C by Yashwant Kanetka, 6<sup>th</sup> Edition, PBP Publication
- The C programming Language by Richie and Kenninghan, 2004, BPB Publication

**Reference Book:**

- Programming in ANSI C by Balaguruswamy, 3<sup>rd</sup> Edition, 2005, Tata McGraw Hill

**BLUE PRINT**

**Code: BCA1B02B18**

**Course: Programming in C**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	10	3	2	0
II	16	2	2	1
III	16	3	2	1
IV	15	2	2	1
V	15	2	1	1

**BCA – CT&ISM (C.B.C.S.S) Examination**

**MODEL QUESTION PAPER**

**I SEMESTER - CORE**

**BCA1B02B18: PROGRAMMING IN C**

**Time : 3 Hrs**

**Maximum Marks : 80**

**PART A**

**(Answer any 10 questions. Each question carries 2 marks)**

1. What is an Algorithm?
2. Define 'Compiler' and 'Interpreter'.
3. What is character set in C?
4. What are the data types in 'C' programming?
5. Write and explain the syntax of switch statement.
6. Explain the different types of arrays.
7. Write a program to print 'Hello C Programming'.
8. What are local and global variables in 'C' programming?
9. Define structures in 'C' programming.
10. What do you mean by 'Call by value'?
11. What are the preprocessors?
12. Define File pointer.

**(10 x 2=20 marks)**

**PART B**

**(Answer any 6 questions. Each question carries 5 marks)**

13. Write a flowchart and algorithm to simulate a calculator.
14. Explain the Machine language and High-level language.
15. What are operators in 'C' programming? Explain.
16. State the differences between 'while' and 'do while' loop with example?
17. Write a 'C' function to find the largest number among three numbers.
18. Write down a program to use structure within union, and display the contents of structure elements.

19. Illustrate the difference between call by value and call by reference methods with suitable examples.
20. Mention instruction codes to print details of 50 students using structures in 'C' programming.
21. Write a 'C' program to read the content of file using 'fgets'.

**(6x 5 = 30 marks)**

### **PART C**

**(Answer any 2 questions. Each question carries 15 marks)**

22. Write a program to find transpose of a given square matrix.
23. Write down the algorithm and program to print 'Fibonacci' series using recursion.
24. What is Dynamic Memory Allocation? Explain DMA with example.
25. Explain the string and mathematical functions in detail with examples.

**(2 x 15 = 30 marks)**



**Semester:** 1

**Course Code:** BCA1B03B18

**Name of the Course:** INTRODUCTION TO UNIX AND SHELL PROGRAMMING

**Duration:** One Semester

**Credits:** 3

**Total Lecture Hours:** 72

**Aim of the course:**

To enable the learners to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification.

**Course Overview and Context:**

The Course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. This Module provides examples to help the learners get a better understanding of the linux system. The Module also provides the guidelines for the learners to take up vendor certifications.

The Module explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting.

**Syllabus Content:**

**Module I:** (15 hrs)

**Introduction to UNIX:** History of UNIX - Unix Components/Architecture - Features of Unix – UNIX Environment and UNIX Structure - Posix and Single Unix specification - The login prompt - UNIX commands – Basic commands - echo, printf, ls, who, date,passwd, cal - Combining commands - Internal and external commands – type, man , more and other commands - theuser terminal, displaying its characteristics and setting characteristics - The root login - super user: sucommand - /etc/passwd and /etc/shadow files - Commands to add, modify and delete users.

**Module II:** (16 hrs)

**UNIX file system:** UNIX File basics - File types and Categories – File Organization – Directories - home directory and the HOME variable - Reaching required files- the PATH variable - Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir

commands. The dot (.) and double dots (..) notations to represent parent directories - File related commands – cat, mv, rm, cp, wc - File inodes and the inode structure. File links – hard and soft links – Head and tail commands - Cut and paste commands - The sort command - Special files /dev/null and /dev/tty - File attributes and permissions - The umask and default file permissions - ls command - Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions

**Module III:** (16 hrs)

**UNIX Process Management:** The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

**Module IV:** (10 hrs)

**Vi Editor:** Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg.

**Module V:** (15 hrs)

**Shell programming:** Introduction – Need for Scripts – Creating and Calling the Script – The Shebang – Different ways of running a script - Using variables in Script – Reading Input – Integer Variables – Arithmetic Expressions – Read-only variables – Exporting variables – Arrays - Control Statements : If, Then, Else, While and Until, Classic For, Break and Continue, Case – Handling Script Parameters : Shift, Getopts – Shell Functions – Handling Conditional expression patterns and Regular expressions in scripts

**Competencies of the course:**

- Gathering awareness of the history of UNIX
- Familiarize with different flavor of Linux
- Understand the File System
- Learn the VI editor
- Gathering knowledge about System Administration

**Text Books**

- Sumitabha Das., Unix Concepts and Applications., 4th Edition., Tata McGraw Hill, July 2017.
- Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming- Cengage Learning – India Edition. 2009

**Reference Books**

- G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education.
- Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2nd Edition , Wiley,2014

**BLUE PRINT**

**Code: BCA1B03B18**

**COURSE TITLE: Introduction to Unix and Shell scripting**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	15	2	2	1
II	16	3	2	1
III	16	3	2	1
IV	10	2	1	0
V	15	2	2	1

**BCA – CT&ISM (C.B.C.S.S) Examination**

**MODEL QUESTION PAPER**

**I SEMESTER - CORE**

**BCA1B03B18: INTRODUCTION TO UNIX AND SHELL SCRIPTING**

**Time: 3 Hrs.**

**Maximum Marks: 80**

**PART A**

**(Answer any 10 questions. Each question carries 2 marks)**

1. What is a Multi-user system?
2. Explain 'chmod' command.
3. Define link and unlink.
4. What is an Inode table? Also define Inode?
5. Explain PID and PPID.
6. What is link() ?
7. What is Process signals?
8. What is pipe?
9. Write the syntax of search and replace command in vi editor.
10. Write the syntax of "wall" and "who" command.
11. List out four roles of system administration.
12. How to temporarily disable user account?

**(10 x 2=20 marks)**

**PART B**

**(Answer any 6 questions. Each question carries 5 marks)**

13. Explain any five system calls in Linux.
14. Write note on UNIX system architecture.
15. Explain the structure of file system in Linux.
16. Explain mounting and unmounting process in detail.
17. Write short notes on daemon process and background process.
18. Write a brief note on (i) Process creation (ii) Process termination.
19. Explain about yanking.

20. Write down the parameters of uname.
21. Explain the rpm package and its management process.

**(6 x 5=30 marks)**

### **PART C**

**(Answer any 2 questions. Each question carries 15 marks)**

22. Describe in detail any 15 basic commands used in Linux.
23. Explain the /(root) file system with a neat diagram.
24. Describe process and process states. Explain UNIX process state transitions with a neat diagram.
25. Discuss the concept of managing users and groups.

**(2 x 15=30 marks)**

**Code: BCA1BP01B18**

**Course Title: Software Lab I (Core)**

Software Lab: 4 hrs. per week

Credits:2

### **I. Introduction to Linux (2 hrs. per week)**

1. Execute 25 basic commands of UNIX.
2. Basics of functionality and modes of VI Editor.
3. Program that accepts user name and reports if user is logged in.
4. WAP which displays the following menu and executes the option selected by user:  
1. ls 2. Pwd 3. ls -l 4. ps -fe
5. Program to print series.
6. Program to replaces all “\*.txt” file names with “\*.txt.old” in the current.
7. Program that echoes itself to stdout, but backwards.
8. WAP that takes a filename as input and checks if it is executable, if not make it executable.
9. WAP to take string as command line argument and reverse it.
10. Program to create a data file in the given format and to perform some operations on the file, such as displaying, sorting, storing etc.

### **II. Programming in C (2 hrs. per week)**

1. Programs to print different series
2. Programs using Arrays
3. Programs using Functions
4. Programs using String
5. Programs using Structures
6. Programs using Union
7. Programs using Pointers
8. Programs using Files

**Scheme of Evaluation for software lab II external is as follows:**

(There will be two questions; the first from C and second from Linux)

**Division of Marks (Practical - 3 hours External)**

First program - questions from LINUX **- 25 marks**

1. Logic – 10 marks
2. Successful compilation – 8 marks
3. Result – 7 marks

Second program – questions from C **- 35 marks**

1. Logic – 20 marks
2. Successful compilation – 10 marks
3. Result – 5 marks

Viva Voce **- 10 marks**

Lab Record **- 10 marks**

( LINUX -Minimum of 10 Programs

C -Minimum: of 15 Programs)

**Total Marks - 80 marks**

**Semester :** 2

**Course Code:** BCA2B04B18

**Name of the Course:** OPERATING SYSTEM

**Duration:** One Semester

**Credits:** 4

**Total Lecture Hours:** 72

**Aim of the course:**

The aim of this course is to develop learners' understanding in the fundamentals of operating system and its working.

**Course Overview and Context:**

An operating system (OS) is a collection of software that manages computer hardware resources. They will be providing common services for computer programs. The operating system is the vital component of the system software in a computer system. It is the intermediary between users and computer hardware. It controls the allocation of resources and services like memory, processor, device, data, etc. Operating systems are now available not only for computers and laptops, but also for small handheld devices like Smart phones, tablets, etc. Operating system examples are – Windows XP, 7, 8, server; LINUX, UNIX, Android, iOS, etc.

This course focuses on the basic concepts of operating system, the internal working, etc. This course deals with memory management, disk management, file systems, deadlock avoidance and prevention, etc.

**Syllabus Content:**

**Module I:** (15 hrs)

**Introduction to Operating System:** Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

**Module II:** (15 hrs)

**Process Management:** Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems.



**Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, Threading issues.

**CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models.

**Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions

**Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

**Module III:** (16 hrs)

**Memory Management:** Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging.

**Virtual Management:** Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation

**Module IV:** (10 hrs)

**Storage Management: File-System Interface:** File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics

**File-System Implementation:** File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery

**Disk Management:** Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

**Module V:** (15 hrs)

**Protection and Security:** Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Capability- Based Systems, Language – Based Protection

**Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

**Competencies of the course:**

- Understand processes and inter-process communication
- Elucidate CPU scheduling methods and analyze the working of semaphores, monitors and message passing
- Discuss about multiprogramming
- Evaluate memory management with bit maps and linked lists
- Interpret paging technology and different page replacement algorithms
- Discuss directories and principles of I/O hardware
- Understand disk scheduling and I/O buffering
- Analyze deadlocks and recognize how to avoid/prevent them
- Understand different protection mechanisms available for use
- Recognize and discuss the different security problems that can be encountered.

**Text books**

- Tanenbaum, Operation System Concepts, 2<sup>nd</sup> Edition, Pearson Education.
- Silberschatz / Galvin / Gagne, Operating System, 6<sup>th</sup> Edition, WSE (WILEY Publication)
- Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall

**Reference Books**

- Garry Nutt, “Operating Systems – A Modern perspective ”, Third Edition, Pearson Education
- Bach, M.J., “Design of UNIX Operating System”, Prentice Hall
- Charles Crowley, “Operating systems – A Design Oriented Approach”, Tata McGrawhill, 1997
- Michel Palmer “Guide o Operating Systems”, Vikas Thomson Learning Publishing, NewDelhi
- Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
- William Stallings, Operating System, 4<sup>th</sup> Edition, Pearson Education.

- H.M.Deitel, Operating systems, 2<sup>nd</sup> Edition ,Pearson Education
- Nutt: Operating Systems, 3/e Pearson Education 2004
- D.M.Dhamdhere, “Operating Systems”, 2nd Edition, Tata McGraw-Hill

**BLUE PRINT**

**Course Code: BCA2B04B18**

**Course Title: Operating System**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	15	2	2	1
II	16	3	2	1
III	16	3	2	1
IV	10	2	1	0
V	15	2	2	1

**Semester : 2**

**Course Code : BCA2B05B18**

**Name of the Course: OOPS WITH C++**

**Duration:** One Semester

**Credits:** 3

**Total Lecture Hours:** 72

**Aim of the course:**

The aim of this course is to introduce object oriented programming using the programming language - C++.

**Course Overview and Context:**

C++ is an object oriented, middle-level programming language. It runs on a variety of operating systems. C++ is an extension of C with a major addition of the class construct feature. C++ is a versatile language for handling very large programs; it is suitable for virtually any programming task including development of editors, compilers, databases, communication systems and any complex real life applications systems.

This course focuses on providing an introduction to object oriented programming concepts, C++ syntax, classes, functions, operators, errors and exceptions, file manipulation etc.

**Syllabus Content:**

**Module I:** (12 hrs)

**Introduction:** Evolution of programming methodologies-Procedure oriented versus Object Oriented Programming-characteristics of OOP, Basics of OOP, Merits and Demerits of OOP.

**Data Types:** Different data types, operators and expressions in C++, Keywords in C++.

**Input and Output:** Comparison of stdio.h and iostream.h, cin and cout.

**Decision and loop:** Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and goto statements, Looping statements- for loop, while loop, Do-while loop.

**Arrays, String and Structures :** Fundamentals-Single dimensional, multi-dimensional arrays, fundamentals of strings, different methods to accept strings, different string manipulations, array of strings, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and

Unions, Enumerated data types-declaration and their usage.

**Module II:** (15 hrs)

**Class:** Definition-defining the class, defining data members and member functions, Access specifier-private, public, protected, objects as function arguments, returning objects from the function, scope resolution operator, member function defined outside the class, difference between class and structure, array as class member data, Array of objects.

**Functions in C++ :** Function definition, function declaration, Built-in functions, user defined functions, calling the function, passing parameter-actual and formal, different methods of calling the function call by value, call by reference using reference as parameter and pointer as parameter, overload function-different types of arguments-different number of arguments, inline function, default argument, storage classes-automatic, external, static, register.

**Constructor and Destructor:** Constructors-constructor with argument, constructor without arguments, constructor with default arguments, Dynamic constructor, constructor overloading, copy constructor, destructors, Manipulating private data members.

**Module III:** (15 hrs)

**Operator overloading:** Defining operator overloading, overloading unary operator, overloading binary operator, manipulation of string using overloaded operator, rules for overloading operator. Data conversion: conversion between Basic types, conversion between objects & Basic types, conversion between objects of different classes.

**Inheritance:** Base Class & derived class, defining derived classes, protected access specifier, public inheritance and private inheritance-member accessibility, constructors and destructors in derived classes, Level of inheritance-single inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance.

**Module IV:** (15 hrs)

**Pointer:** Pointer declaration and Access, Pointer to void, pointer and arrays, pointer constant and pointer variable, pointer and functions, pointer, call by pointer arrays, array of pointers to string, pointer sort, memory management-new and delete, pointer to object-referencing members using pointers, self containing class, this pointer, returning values using this pointer

**Virtual function:** Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract class, virtual base class

**Friend functions and static function:** Purpose, defining friend functions, friend classes, static function, accessing static function numbering positive objects.

**Module V:** (15 hrs)

**Templates and Exception Handling:** Introduction to templates, class templates, function templates, Member function templates, Template arguments, Exception handling.

**Console I/O Operator :** C++ stream and C++ stream classes, unformatted I/O operators, formatted I/O operators-manipulators-user defined manipulators.

**Files:** Class for file stream operators, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple object, stream class, file pointer-specifying the position, specifying the object, tellg() function, seekg() function. Command line arguments.

**Competencies of the course:**

- Understand the object oriented programming concepts
- Recognize the features and characteristics of the C++ programming language
- Understand the concept of classes, functions, variables and operators
- Discuss the functions and importance of constructors and destructors
- Understand how to implement operator overloading
- Recognise the different types of inheritance and polymorphism and understand how to implement them.
- Understand the functions of pointers
- Discuss the different types of exceptions and errors that can occur in a C++ program and understand how to handle them.
- Understand the use and purpose of virtual function, friend function, static function, etc.
- Understand how to implement files and manipulate them

**Text Books**

- E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications
- Let us C++ by Yeshwanth Kanetkar
- Stroustrup: The C++ Programming Language, Pearson Edition, 3rd Edition

- Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications

**Reference Books**

- Lippman: C++ Primer, 3/e Pearson Education
- C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.

**BLUE PRINT**

**Code: BCA2B05B18**

**COURSE TITLE: OOPS WITH C++**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	12	2	1	-
II	15	3	2	1
III	15	3	2	1
IV	15	2	2	1
V	15	2	2	1

**Semester:** 2

**Course Code:** BCA2B06B18

**Name of the Course:** DATA STRUCTURES USING C

**Duration:** One Semester

**Credits:** 3

**Total Lecture Hours:** 72

**Aim of the course:**

The aim of this course is to make the learners understand the different structures that can be used to store data in the memory, how to manipulate the storage of data, how to sort and search for a data, etc.

**Course Overview and Context:**

Data is needed by the computer to perform different operations. These operations can be logical or arithmetic. Data can be numbers, alphabets, symbols, etc. When the quantity of data increases, then storing them becomes the biggest concern for every system. A program or an operation will work efficiently if the data is easily accessible and stored safely. This is where you use data structures. Data structures helps in storing data in a well-organized manner in the memory. You will be able to perform a series of operations like storing, retrieving, sorting, searching, etc on a data structure.

This course covers the basics of data structure and dynamic memory allocation. It deals with operations like sorting, searching, retrieving, etc. Operations on data structures like stacks, queues, linked lists, trees, arrays, and graphs are covered here.

**Syllabus Content:**

**Module I:** (10 hrs)

**Introduction to Data structures :** Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion in C (advantages), Writing Recursive



programs – Binomial coefficient, Fibonacci, GCD.

**Module II:** (15 hrs)

**Searching and sorting:**

**Basic Search Techniques:** Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search.

**Sort:** General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort

**Module III:** (15 hrs)

**Stack and Queue:**

**Stack** – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks.

**Queue** - Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque) , Priority queue , Operations on all types of Queues.

**Module IV:** (16 hrs)

**Linked List:** Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

**Module V:** (16 hrs)

**Tree, Graphs and their Applications:**

**Tree:** Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder.

**Graphs:** Graphs, Application of Graphs, Depth First search, Breadth First search.

**Competencies of the course:**

- Understand the basic data structures and their classifications
- Analyze how to allocate memory dynamically
- Understand the advantages of recursive functions
- Understand and compare different searching techniques
- Understand and compare different sorting algorithms
- Identify the uses of stack data structure and understand their implementation
- Identify the uses of queue data structure and understand their implementation
- Compare the different types of linked lists and understand the operations that can be performed on a linked list
- Understand the different operations that can be conducted on a tree data structure.
- Understand how to implement the graph data structure.

**Text Books:**

- Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
- Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
- Robert Kruse Data Structures and program designing using 'C'
- Trembley and Sorenson Data Structures

**Reference Books:**

- Bandyopadhyay, Data Structures Using C Pearson Education, 1999
- Tenenbaum, Data Structures Using C. Pearson Education, 200
- Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
- Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
- Langsam, AusensteinMaoshe& M.Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**BLUE PRINT**

**Code : BCA2B06B18**

**COURSE TITLE: DATA STRUCTURES USING C**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	10	2	2	1
II	16	2	1	1
III	16	3	2	1
IV	15	2	2	1
V	15	3	2	0

**Course Code: BCA2BP02B18**

**Name of the Course: SOFTWARE LAB-II**

**Credits: 2**

**I. OOPS WITH C++ - LAB (2 hrs per week)**

1. Basic C++ programs using operators, control statements and loops.
2. Programs to implement Arrays, Strings and Structures.
3. Program to implement class.
4. Program to implement functions.
5. Program to implement constructor and destructor
6. Program to implement operator overloading.
7. Program to implement all types of inheritance.
8. Program to implement pointer.
9. Program to implement virtual function.
10. Program to implement friend functions and static function.
11. Program to implement templates and exception handling.
12. Program to implement files.

**II. DATA STRUCTURES USING C – LAB (2 hrs per week)**

1. Program to implement Arrays
2. Program to implement Recursive Functions
3. Program to implement Pointers
4. Program to implement Searching Techniques
5. Program to implement Sorting Techniques
6. Program to implement Stack
7. Program to implement Queue
8. Program to implement Linked List
9. Program to implement Trees
10. Program to implement Graph

**Scheme of Evaluation for software lab III external is as follows:**

(There will be two questions, the first program from OOPS With C++ and second program from Data Structures using C)

**Division of Marks (Practical - 3 hours External)**

First Program- questions from OOPS with C++ Lab - 25 marks

1. Logic – 10 marks
2. Successful compilation – 8 marks
3. Result – 7 marks

Second questions from Data Structures using C - 35 marks

1. Logic – 20 marks
2. Successful compilation – 10 marks
3. Result – 5 marks

Viva Voce - **10 marks**

Lab Record - **10 marks**

(OOPS with C++ -Minimum of 10 Programs

Data Structures using C – Minimum of 15 Programs)

**Total Marks**

**- 80 marks**

**Semester: III**

**Course Code: BCA3B07B18**

**Name of the course - INFORMATION SECURITY FUNDAMENTALS**

**Duration:** One semester

**Credits:** 4

**Total Lecture Hours:** 72

### **Aim of the course**

To enable starters to know the fundamentals of Information Security, Need of Information Security, Business needs, Threats, Attacks. And also to get familiarize with Risk Management, Risk Mitigation, Risk Control and also to know the Network Infrastructure security, Monitoring Network, Physical & Network Security.

### **Course Overview and Context**

The Module initially covers the Introduction part of Information Security like how it emerges first, the essential principles and concepts that are crucial with the components. And it also says about the Access and Balancing the Information Security. It deals also with the execution, SDLC and the organizational professionals in security.

The Module highlights the Business needs, Threats, Attacks and explains how these are violating the system.

Finally, the Module covers the Risk Management to Identify & Access Risk related on the probability of occurrence and its impact, the basic Risk Assessment, Risk Mitigation, Strategy and the list of controls. It deals along Network Infrastructure Security to secure the Device based, Media based and with the monitoring of Network, Firewall, IDS and IPS, hardening of applications and at last it says about the Physical & Network Security.

### **Syllabus Content**

**Module I:** (14 hrs)

**Know the Basics about the Information Security:** Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System; Balancing Information Security and Access; implement IT Security, The system Development Life cycle, Security professional in the organization.

**Module II:** (14 hrs)

**Gain Skills on the Need of Information Security:** Business Needs-Protecting the functionality, Enabling the safe operations, Protecting the data, safe guarding the technology assets; Threats-compromises to Intellectual property, deliberate software attacks, Espionage and trespass, sabotage and vandalism; Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering.

**Module III:** (15 hrs)

**Identify how the Risk Management Performs:** Definition of risk management, risk identification, and risk control, Identifying and Accessing Risk, Assessing risk based on probability of occurrence and likely impact, the fundamental aspects of documenting risk via the process of risk assessment, the various risk mitigation strategy options, the categories that can be used to classify controls.

**Module IV:** (15 hrs)

**Know the detailed descriptions on Network Infrastructure Security and Control:** Understanding Infrastructure Security- Device Based Security, Media-Based Security, Monitoring and Diagnosing; Monitoring Network- Firewall, Intrusion Detection System, Intrusion Prevention system; OS and Network Hardening, Application Hardening; Physical and Network Security- Policies, Standards and Guidelines.

**Module V:** (14 hrs)

**Information Asset Classification:** Classification of Information, Information Assets – Owner, Custodian, User, Information Classification in terms of Secret, Confidential, Private and Public, Declassification. Retention and Disposal of Information Assets. Provide Authorization for Access – Owner, Custodian and User

**Competencies of the course**

On a successful completion of this course the learner will:

- Understand the Basics of Information Security
- Gain skills on the Needs of IT Security
- Identify how the Risk Management performs
- Know the detailed descriptions on Network Infrastructure Security and Control.

**Text Books:**

- Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009)
- Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
- Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)

**Reference Books:**

- Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)
- Cryptography and Network Security Principles and Practices, by William Stallings, Pearson Education; Seventh edition (30 June 2017)

**BLUE PRINT**

**Code: BCA3B07B18**

**Course Title: Information Security Fundamentals**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	14	2	1	1
2	14	2	2	1
3	15	2	2	1
4	15	2	2	1
5	14	4	2	0



**Semester: III**

**Course Code: BCA3B08B18**

**Name of the Course: SOFTWARE ENGINEERING**

**Duration:** One Semester

**Credits:** 4

**Total Lecture Hours:** 72

**Aim of the course:**

The aim of this course is to enable the learner to understand the different processes that are followed in developing a software.

**Course Overview and Context:**

Software can be defined as ‘computer instructions or data’ The term ‘Software Engineering’ is applied to the study and application of engineering for the purpose of design, development and maintenance of software. In general, it is the set of rules and procedures to be followed while developing computer software. Software Engineering is all about the right practices and approach towards computer programming; hence everyone is of the opinion that it must be considered as an engineering segment rather than art or craft.

This course deals with the different software development lifecycle models, and software testing. It also deals with software project management concepts like different models, planning, scheduling, etc.

**Syllabus Content:**

**MODULE I:** (10 hrs)

**Software Product And Process:** Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.

**MODULE II:** (16 hrs)

**Software Requirements:** Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary.

**MODULE III:** (16 hrs)

**Analysis, Design Concepts And Principles:** Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

**MODULE IV:** (15 hrs)

**Testing:** Taxonomy Of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Module Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques

**MODULE V:** (15 hrs)

**Software Project Management:** Measures And Measurements – ZIPF's Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools

**Competencies of the course:**

- Understand the different attributes of a good software
- Recognize how to overcome the key challenges and rules to be followed in various phases of software development
- Understand different models followed during SDLC along with examples
- Understand the different phases of SDLC
- Understand the different types of software testing
- Compare the different types of software testing
- Understand the different cost estimation models
- Recognize the different project planning and scheduling techniques
- Understand how to develop an error free software and analyze which SDLC model to select
- Recognize risk management in software project management

**Text Books:**

- Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007

**Reference Books:**

- Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005

**BLUE PRINT**

**Code: BCA3B08B18**

**Course Title: Software Engineering**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	10	2	1	0
II	16	3	2	1
III	16	3	2	1
IV	15	2	2	1
V	15	2	2	1

**Semester: III**

**Code: BCA3B09B18**

**Name of the Course: COMPUTER NETWORKS**

**Duration: One Semester**

**Credits: 4**

**Total Lecture Hours: 72**

**Aim of the course:**

To enable learners to understand computer networking concepts, how they work, how they operate and the protocols, standards and the models associated with networking technology and their troubleshooting mechanisms.

**Course Overview and Context:**

It is important for networking professionals to have a sound grounding in the basics of networking and with the networking technology being developed thick and fast, the professionals need to be updated of them at all times. The focus of this Module is providing a background to the basics of networking and its underlying principles.

The learners taking this Module will explore the fundamentals of networking, the principle and purpose behind layered models, devices used in networks and their wireless connectivity and the ways to troubleshoot network related issues. The Module underpins the principles of networking and enables the learners to work towards taking up vendor certifications in the networking domain.

**Syllabus Content:**

**Module I: (10 hrs)**

**Networking Fundamentals:** Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture- Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, media connectors (Fiber optic, Coaxial, and TP etc.) Introduction of OSI model, Seven layers of OSI model,

Functions of the seven layers, Introduction of TCP/IP Model, TCP, UDP, IP, ICMP, ARP/RARP, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses

**Module II:** (17 hrs)

**Basics of Network Devices:** Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, and modem, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components, Point-to-Point Protocol (PPP), PPP standards, Address Resolution Protocol, Message format, transactions, Wireless Networking: Wireless Technology, Benefits of Wireless Technology, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, Wireless network Components: Wireless Access Points, Wireless NICs, wireless LAN standards: IEEE 802.a, IEEE 802.b, IEEE 802.g, wireless LAN modulation techniques, wireless security Protocols: WEP, WPA, 802.1X, Installing a wireless LAN

**Module III:** (17 hrs)

**Basics of Network, Transport and Application Layers:** Network Layer: Internet Protocol (IP ), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP Address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, Internet Control Message Protocol (ICMP ), ICMPv4, ICMPv6, Internet Group Management Protocol (IGMP ), Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP.

**Module IV:** (15 hrs)

**WAN Technology:** What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fiber, Cellular Technologies, Connecting LANs : Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation, Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPsec, SSL and TLS,

Firewall, Other Security Appliances, Security Threats.

**Module V:** (13 hrs)

**Network Operating Systems and Troubleshooting Network:** Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.

**Competencies of the course:**

- Understand the fundamentals of networks
- Understand and recall the OSI model and IP Addressing
- Recall the various network devices and their wireless networking
- Understand and apply the network troubleshooting methods

**Text Books:**

- CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
- CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013

**Reference Books**

- Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
- CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

**BLUE PRINT**

**Code: BCA3B09B18**

**COURSE TITLE: COMPUTER NETWORKS**

<b>Modules</b>	<b>Hours</b>	<b>PART A 2 marks 10/12</b>	<b>PART B 5 marks 6/9</b>	<b>PART C 15marks 2/4</b>
I	10	2	2	1
II	17	3	1	1
III	17	2	2	1
IV	15	2	2	1
V	13	3	2	0

**Semester: III**

**Course Code: BCA3B10B18**

**Name of the Course: RDBMS**

**Duration: One Semester**

**Credits: 3**

**Total Lecture Hours: 72**

**Aim of the course:**

The aim of this course is to give learners an understanding of the concepts and issues related to databases and database design as well as the practical skills to translate that understanding into the design and creation of complex databases.

**Course Overview and Context:**

Databases play an integral part in commercial domains. Users will be able to store, model and retrieve data. Development of secure databases is an important task when it comes to computing. Database Management Systems (DBMS) provide the systems, tools and interfaces by which the organization can manage their information and use it to assist in the effective running of the organization.

This course explores database architecture, database management system and the use of databases in an organizational context. Database design techniques are investigated and successful learners will be able to apply theoretical understanding to design, create and document a database system.

**Syllabus Content:**

**MODULE I: (15 hrs)**

**Introduction:** Purpose of Database System — Views of data – Data Models – Database Languages — Database System Architecture – Database users and Administrator – Entity–Relationship model (E-R model ) – E-R Diagrams -- Introduction to relational databases

**MODULE II: (10 hrs)**

**The relational Model:** The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- Oracle data types, Data Constraints, Column level & table Level Constraints



**MODULE III:** (16 hrs)

**SQL fundamentals:** working with Tables. Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL.

Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User.

Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL– Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

**MODULE IV:** (15 hrs)

**Database Design:** Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

**MODULE V:** (16 hrs)

**Transaction Concepts:** Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery – Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

**Competencies of the course:**

- Analyze the issues and applications of databases within an organization
- Understand the features and advantages of DBMS and RDBMS
- Analyze the database developmental methodology, entity-relationship modelling and normalization
- Understand different queries that can be used on a database

- Analyze different normal forms and recognize how to optimize the database
- Understand Join operations
- Understand different transaction protocols
- Recognize how to avoid deadlock
- Understand different types of databases
- Recognize how to normalize a database applying different normal forms

#### **Text Books**

- Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006
- Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addison Wesley, 2007.

#### **Reference Books**

- Avison D and Fitzgerald G – Information Systems Development: Methodologies, Techniques and Tools, McGraw Hill Higher Publishing Company, 2006
- Connolly T and Begg C – Database Systems: A Practical Approach to Design, Implementation and Management, Addison Wesley, 2004
- Howe D – Data Analysis for Database Design, Butterworth-Heinemann Ltd, 2001
- Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.
- Chao L – Database Development and Management, CRC Press, 2006
- Kroenke D – Database Concepts, 2nd Edition, Prentice Hall, 2004
- Ritchie C – Relational Database Principles, Thomson Learning, 2002

**BLUE PRINT**

**BCA-CT&ISM Semester III - Core Course**

**Code: BCA3B10B18**

**COURSE TITLE: RDBMS**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	15	2	2	1
II	10	2	1	-
III	16	3	2	1
IV	15	2	2	1
V	16	3	2	1

**Semester: III**

**Subject Code: BCA3B11B18**

**Name of the Course: PROGRAMMING in JAVA**

**Duration: One Semester**

**Credits: 3**

**Total Lecture Hours: 72**

**Aim of the course:**

The aim of this course is to provide learners with an understanding of the object oriented concepts which helps in the field of programming, management of data, etc. and of Java programming which helps to explore the object oriented nature of the language and the multi-platform versatility offered by it.

**Course Overview and Context:**

Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent. The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc.

Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones.

This course focuses on the concepts of object oriented programming language and the different constructs for creating applications in java.

**Syllabus Content:**

**Module I: (16 hrs)**

**Introduction:** History, Overview of Java, Object Oriented Programming, A simple Programme, Two control statements - if statement, for loop, using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words.

**Data types:** Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays.

**Operators:** Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence.

**Control Statements:** Selection Statements - if, Switch

**Iteration Statements:** While, Do-while, for Nested loops, Jump statements.

**Module II:** (16 hrs)

**Classes:** Class Fundamentals, Declaring objects, Assigning object reference variables, Methods, constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods, using objects as parameters, Argument passing, Returning objects, Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments.

**Inheritance:** Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance.

**Module III:** (15 hrs)

**Packages:** Definition, Access protection importing packages, Interfaces: Definition implementing interfaces.

**Exception Handling:** Fundamental, Exception types, Using try and catch, Multiple catch clauses, Nested try Statements, throw, throws, finally, Java's Built - in exception, using Exceptions.

**Module IV:** (15 hrs)

**Multithreaded Programming:** The Java thread model, The main thread, Creating a thread, Creating multiple thread, Creating a thread, Creating multiple threads, Using isalive() and Join(), Thread - Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi threading. I/O basics, Reading control input, writing control output, Reading and Writing files, Applet Fundamentals, the AWT package,AWT Event handling concepts The transient and volatile modifiers, using instance of using assert.

**Module V:** (10 hrs)

**JAVA Database Connectivity (JDBC):** JDBC architecture, JDBC Drivers, the JDBC API: loading a driver, connecting to a database, Creating and executing JDBC statements, Handling

SQL exceptions, Accessing result sets: Types of result sets, Methods of result set interface. An example JDBC application to query a database.

**Competencies of the course:**

- Discuss the basic characteristics of object oriented programming
- Evaluate and discuss the different object oriented concepts
- Discuss the principles, characteristics and features of programming in Java
- Understand the different data types, data structures and loops to create solutions in java for assignments
- Recognise the different java packages and their functions, collections framework, etc.
- Design and implement the I/O and networking operations, exceptions and exception handling, etc.
- Understand the different user interface components
- Identify the uses and features of multithreaded programming
- Identify the different drivers used for JDBC connectivity
- Explain database manipulation using JDBC connectivity

**Text Books:**

- The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.
- SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

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**Code: BCA3B11B18**

**Course Title: Programming in JAVA**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	16	2	1	1
2	16	2	2	1
3	15	2	2	1
4	15	2	2	1
5	10	4	2	0

**Semester: III**

**Course Code: BCA3BP03B18**

**Name of the Course: SOFTWARE LAB-III**

**Credits: 2**

**I. RDBMS - LAB (2hrs per week)**

**Syllabus Content:**

1. SQL Commands
  - a. Data Definition Language commands,
  - b. Data Manipulation Language commands,
  - c. Data Control Language commands and
  - d. Transaction Control Language commands
2. Select Statements with all clauses/options
3. Nested Queries
4. Join Queries
5. Views
6. High level programming language extensions (Control structures, Procedures and Functions)
7. Database Design and implementation (Mini Project)

**II. PROGRAMMING in JAVA – LAB (3hrs per week)**

**Syllabus Content:**

1. Program implementing basic operators.
2. Program to implement control statements and loops.
3. Program to implement methods, recursion, overloading.
4. Program to implement inheritance and overriding.
5. Program using Abstract classes.
6. Program to implement exception handling
7. Program to implement threads.
8. Program to implement interfaces.
9. Program to implement Applet and AWT package.
10. Program to implement JDBC.



**Scheme of Evaluation for software lab III external is as follows:**

(There will be two questions, the first program from RDBMS and second program from Programming in Java )

**Division of Marks (Practical - 3 hours External)**

First Program- questions from RDBMS Lab - 25 marks

1. Logic – 10 marks
2. Successful compilation – 8 marks
3. Result – 7 marks

Second questions from Programming using Java - 35 marks

1. Logic – 20 marks
2. Successful compilation – 10 marks
3. Result – 5 marks

**Viva Voce - 10 marks**

**Lab Record - 10 marks**

(RDBMS Lab -Minimum of 10 Programs

Programming using Java – Minimum of 15 Programs)

**Total Marks**

**- 80 marks**

**Semester: IV**

**Course Code: BCA4B12B18**

**Name of the Course: BASICS OF SERVER OPERATING SYSTEM**

**Duration:** One Semester

**Credits:** 04

**Total Lecture Hours:** 72

**Aim of the course:**

To educate the students about the Basics of a Sever operating system using Windows server 2008.

**Course Overview and Context:**

In totality it is a vast subject and the horizon spreads wide. This course covers “Windows Server 2008” installation and configuration of network and network services.

**Syllabus Content:**

**Module I:** (10 hrs)

**Introduction:** History of Server OS, Introduction to windows server 2003 & 2008, Overview of Windows Server 2008

**Installing and Configuring Windows Server 2008:** Installing Windows Server 2008, Managing Server Roles and Features, Configuring and Managing Windows Server 2008 Server Core

**Module II:** (15 hrs)

Choosing a Deployment Technology, Deploying Windows Server 2008, Introduction and Creation of Users accounts

**Configuring Networking and Network Services:** Configuring IPv6 Addressing, Migrating from IPv4 to IPv6

**Module III:** (15 hrs)

DHCP and DNS Enhancements in Windows Server 2008, Configuring zones, Configuring DNS server settings, Configuring zone transfer and Replication, Configuring and Managing Windows Firewall with Advanced Security.

**Module IV:** (16 hrs)

**Configuring and Managing Active Directory Domain Services:** Active Directory Enhancements in Windows Server 2008 and 2008 R2, Installing and Configuring Domain Controllers, Configuring Read-Only Domain Controllers, Configuring Fine-Grained Password Policies, Sites and Global Catalog, Managing Active Directory Objects with Windows PowerShell, Active Directory Database Management, Replication between the Domain Controllers.

**Module V:** (16 hrs)

**Managing Group Policy in Active Directory Domain Services:** Group Policy Enhancements in Windows Server 2008, Managing Security with Group Policy, Managing Clients with Group Policy Preferences, Server Management in Windows Server 2008: Managing Windows Server with Server Manager, Managing Server Updates by Using WSUS, Managing Backup and Restore by Using Windows Server Backup, Managing Event Logs and Auditing, Performance and Resource Management.

**Competencies of the course:**

- How to install “windows server 2008”
- Configuring different types of server
- Learning about deployment technology
- Configuring network and networking services
- Installation of Active Directory

**Text Books:**

- 70-642:Windows Server 2008 Network Infrastructure Configuration (MOC) from John Wiley & Sons, 2009
- Windows Server 2008: the definitive guide By Jonathan Hassell, O'Reilly, 2008

**Reference Books:**

- MCTS: Windows Server 2008 Network Infrastructure Configuration Study Guide By William Panek, Tlor Wentworth, James, O'Reilly, 2011

**BLUE PRINT**

**Code: BCA4B12B18**

**Course Title: Basics of Server Operating System**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	10	4	1	0
2	15	2	2	1
3	15	2	2	1
4	16	2	2	1
5	16	2	2	1

**Semester: IV**

**Course Code: BCA4B13B18**

**Name of the course: DATABASE SECURITY FUNDAMENTALS**

**Duration: One Semester**

**Credits: 04**

**Total Lecture Hours: 72**

**Aim of the course:**

To enable learner to familiarize with the Enterprise Database and Data Warehousing environment with advantages and its growing importance in Organization's Business environment. With this in mind it helps the learner to understand the criticality of the database resource thereby to provide an idea to enable protective measures through server hardening.

**Course Overview and Context:**

The Module provides the Background idea about the Broad structure of Database and Data warehousing environment and also it explains the methodology to design a database and advantages of Database management system. By explaining the irreplaceable functionality and feature that a DBMS can offer to an IT system, the learner will understand the criticality of the resource.

The Module explains the Basic security measures available in the different Database management software Products like ORACLE and SQL and also explains the implementation of access control mechanism using Data Control Language.

The Module also covers the importance of integrity in building databases and how it can be achieved. There is an in depth coverage of SQL injection attacks and countermeasure and a detailed procedure on securing a database server by removing unwanted services. Finally it makes the learner to understand the step by step Data warehousing process and Vulnerability management procedure to maintain a secure Database management system.

**Syllabus Content:**

**Module I :** (16 hrs)

**Introduction to Database & DBMS Architecture:** Hierarchical Database Management Systems, Network Database Management Systems, Relational Database Management Systems, Object-Oriented Database Management Systems, End-User Database Management Systems, Spreadsheets, Hardening the Database Environment.

**Module II :** (13 hrs)

**Introduction to Database Interface Languages:** Concepts of Database Interface Languages, Basic Security measures in Oracle and SQL, Database Integrity, Triggers and Event, Configuring the Server auditing

**Module III :** (12 hrs)

**SQL injection attacks and Counter measures:** SQL Injection, Prevention of SQL Injection, Open Connectivity Database and Object Linking and Embedding.

**Module IV :** (15 hrs)

**Introduction to Accessing Databases through the Internet:** Concept of Accessing Databases through the Internet, the three tier approach, securing a Web server and a Database server, Remove Unnecessary Services if not needed to the business operation, Remote access, Development and Security testing, monitoring the events.

**Module V :** (16 hrs)

**Introduction to Data Warehousing concepts:** The concept of Data Warehousing, Metadata and Online Analytical Processing (OLAP)Data mining, Database Vulnerabilities and threats, Vulnerability Scanners, Monitoring and Base lining, Patch management, Procedure for Patch management.

**Competencies of the course:**

On successful completion of this Module, the learner will:

- Describe the importance of Database and protective measures for ORACLE and SQL
- Demonstrate Different types of SQL injection attacks and Countermeasures
- Evaluate the importance of Database security in the Internet architecture
- Understand the vulnerability management process in Database security.

**Text Books:**

- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
- Database security by Silvana Castano, 2nd Edition, Pub: Addison-Wesley Professional, 2008
- Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKT publishing, 1st ed; 2012

**Reference Books:**

- Handbook of database security: Applications and Trends Michael Gertz, Sushil Jajodia, Pub: Springer, 1st ed; 2008
- Implementing database security and auditing, Ron Ben-Natan, Pub: Digital Press, 1st ed; 2005

**BLUE PRINT**

**Code: BCA4B13B18**

**COURSE TITLE: DATABASE SECURITY FUNDAMENTALS**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	16	3	2	1
II	13	2	2	1
III	12	2	1	-
IV	15	2	2	1
V	16	3	2	1

**Semester: IV**

**Course Code: BCA4B14B18**

**Name of the Course: PRINCIPLES OF VIRTUALIZATION**

**Duration:** One Semester

**Credits:** 04

**Total Lecture Hours:** 72

**Aim of the course:**

To enable learners to understand Virtualization, planning for a virtual implementation and also prepare for different vendor technologies available in the field of Virtualization.

**Course Overview and Context:**

Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility in organizations.

This Module explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server Hyper V

**Syllabus Content:**

**Module I:** (17 hrs)

**Basics of Virtualization:** Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery.

**Module II:** (9 hrs)

**Deploying and Managing an Enterprise Desktop Virtualization Environment:** Configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images



**Module III:** (17 hrs)

**Deploying and Managing a Presentation Virtualization Environment:** Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

**Module IV:** (16 hrs)

Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings,

**Module V:** (13 hrs)

**Understanding Virtualization Software:** List of virtualization Software available . Vmware- introduction to Vsphere, ESXi, VCenter Server and Vsphere client. Creating Virtual Machine.. Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals.

**Competencies of the course:**

- Understand Virtualization
- Understand and Implement VMware Virtualization
- Install VMware Components
- Understand and Configure Window server 2008 Hyper V

**Text Books:**

- Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
- Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008.

**Reference Book:**

- Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

**BLUE PRINT**

**Code: BCA4B14B18**

**COURSE TITLE: PRINCIPLES OF VIRTUALIZATION**

<b>Modules</b>	<b>Hours</b>	<b>PART A 2 marks 10/12</b>	<b>PART B 5 marks 6/9</b>	<b>PART C 15marks 2/4</b>
I	17	3	2	1
II	9	2	2	1
III	17	2	1	1
IV	16	2	2	0
V	13	3	2	1

**Semester: IV**

**Course Code: BCA4B15B18**

**Name of the Course: INTRODUCTION TO CLOUD TECHNOLOGY**

**Duration: One Semester**

**Credits: 03**

**Total Lecture Hours: 72**

**Aim of the course:** To educate the students about the cloud technology and different aspects of the same.

**Course Overview and Context:**

This course covers cloud technology in a whole. This covers the delivery models, risks and the methodology of cot management and the selection of the services offered by the Service provider.

**Syllabus Content:**

**Module I: (15 hrs)**

**Introduction:** Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

**Module II: (16 hrs)**

**Cloud Computing Companies and Migrating to Cloud:** Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

**Module III:** (16 hrs)

**Cloud Cost Management and Selection of Cloud Provider:** Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

**Module IV:** (15 hrs)

**Governance in the Cloud:** Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

**Module V:** (10 hrs)

**Ten cloud do and do not's:** Don't be reactive, do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.

**Competencies of the course:**

- Awareness about the different types of Cloud
- Awareness about the different cloud services
- Cost Management while using the cloud services
- Governance of the cloud services
- List of Do's and Do not's

**Text Books**

- Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011
- Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010

**Reference Book**

- Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

**BLUE PRINT**

**Code: BCA4B15B18**

**COURSE TITLE: Introduction to Cloud Technology**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	15	2	2	1
II	16	3	2	1
III	16	3	2	1
IV	15	2	2	1
V	10	2	1	0

**Semester: IV**

**Course Code: BCA4B16B18**

**Name of the course: ETHICAL HACKING FUNDAMENTALS**

**Duration: One Semester**

**Credits: 03**

**Total Lecture Hours: 72**

**Aim of the course:**

To enable learner to make better understand the Ethical Hacking concepts and various phases of Hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques. To make him familiarize with the wide range of attacks in a Networking environment and to enable him/her to prepare a well defined vulnerability reporting procedure along with the remediation techniques.

**Course Overview and Context:**

The Module Primarily covers the Ethical Hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System Hacking techniques and a broad knowledge about white box and black box testing.

The Module describes a wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session Hijacking and severe vulnerabilities that can be seen in Web Applications. The Module also covers Hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls.

The Module not only captures valuable information on vulnerabilities and threats but also covers an effective way of report making methodology that can helps the top level management to take immediate decisions on mitigating the threats.

**Syllabus Content**

**Module I: (10 hrs)**

**Introduction to Ethical Hacking:** Ethical Hacking, why is it necessary, scope and limitations, skills required, phases of ethical hacking, tools and techniques, Black Box, Gray Box and White Box techniques, differences between vulnerability assessment, ethical hacking and penetration testing, Reverse engineering, Ethical hacking terminology, Exploit, Vulnerability – Zero-day, manual PT, Case Studies on data breaches and cybercrimes involving hacking

**Module II:** (15 hrs)

**Ethical Hacking through Attacks and Exploits:** EH methodology, attacks, exploits, Denial of Service, Sniffers, malware, Session Hijacking and ethical hacking of Web Servers and applications, Password Cracking, Key Logger, Hash Injection attack, replay and man-in-the-middle attacks, rainbow table attack, distributed network attack, spoofing, phishing, spyware, rootkits, hiding files, counter measures

**Module III:** (16 hrs)

**Web and Network Hacking:** Enumeration and scanning, host discovery, type of scanning – TCP SYN, ACK, XMAS & UDP Port scanning, SQL Injection, Social Engineering, Buffer Overflows, Input data validation, physical penetration attacks, Hacking Wireless Networking, Hacking mobile platforms, Windows and Linux Hacking, Evading IDS, Firewalls and Honeypots, DDoS attacks, using metasploit, counter measures

**Module IV:** (16 hrs)

**Report Writing & Mitigation:** Introduction to Report Writing & Mitigation, requirements for low level reporting & high-level reporting of Penetration testing results, Demonstration of vulnerabilities and mitigation of issues identified including tracking, CVSS scoring for vulnerabilities, rating and prioritization, impact of these in reporting

**Module V:** (15 hrs)

**Ethical Hacking and Legal System:** Overview of India's Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008 – sections 43, 65 and 66, how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries.

**Competencies of the course**

- Understand the Ethical Hacking Methodology and Phases
- Demonstrate the Attacks and Vulnerabilities in Web Application servers
- Demonstrate Attacks against Linux environment
- Understand the Reporting Procedure and control suggestion for mitigation

**Text Books:**

- Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017)

- CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016)
- Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017)
- An Ethical Guide To WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August 2014)
- Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 1st edition (2016)

**Reference Books:**

- The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September 2013)
- Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C. Smalls

**BLUE PRINT**

**Code: BCA4B16B18**

**Course Title: Ethical Hacking Fundamentals**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	10	4	1	0
2	15	2	2	1
3	16	2	2	1
4	16	2	2	1
5	15	2	2	1



**Semester: IV**

**Course Code: BCA4BP04B18**

**Name of the course: SOFTWARE LAB-IV**

**Credits: 2**

**I. INTRODUCTION TO CLOUD TECHNOLOGY – LAB (2 hrs per week)**

**Syllabus content:**

1. Study the basic cloud architecture and represent it using a case study
2. Enlist Major difference between SAAS PAAS & Iaas also submit a research done on various companies in cloud business and the corresponding services provided by them, tag them under SAAS , Paas & Iaas.
3. Present a report on google cloud and other cloud services
4. Present a report on obstacles and vulnerabilities in cloud computing on generic level
5. Present a report on Amazon cloud services.
6. Present a report on Microsoft cloud services.
7. Present a report on cost management on cloud
8. Enlist and explain legal issues involved in the cloud with the help of a case study
9. Explain the process of migrating to cloud with a case study.
10. Study various services available on AWS cloud platform.

**II. ETHICAL HACKING (3 hrs per week)**

**Syllabus Content:**

1. Explore the knowledge on Passive Reconnaissance using “Who is” and Online tools
2. Understand about the Active Reconnaissance using “Sam pad” and web site details
3. Understand about the Full Scan, Half Open Scan and Stealth scan using “nmap”
4. Understand about the UDP and Ping Scanning using “Advance LAN Scanner” and “Superscan”
5. To gain knowledge on Packet crafting using “Packet creator” tools
6. Gain exposure on Exploiting NetBIOS vulnerability
7. To gain knowledge on Password Revelation from browsers and social networking application
8. Gain exposure on Creating and Analyzing spoofed emails

9. To gain knowledge on Creating and Analyzing Trojans

10. Gain exposure on OS password cracking.

**Scheme of Evaluation for software lab III external is as follows:**

(There will be two questions, the first from Introduction to cloud and second from Ethical hacking)

**Division of Marks (Practical - 3 hours External)**

First questions from Introduction to Cloud Technology - 25 marks

1. Logic – 10 marks
2. Successful compilation – 8 marks
3. Result – 7 marks

Second questions from Ethical Hacking - 35 marks

1. Logic – 20 marks
2. Successful compilation – 10 marks
3. Result – 5 marks

Viva Voce - 10 marks

Lab Record - 10 marks

(Introduction to cloud -Minimum of 10 Programs

Ethical hacking – Minimum of 10 Programs )

**Total Marks - 80 marks**

**Semester: V**

**Course Code: BCA5B17B18**

**Name of the course: IT, Environment & Human Rights**

**Duration: One Semester**

**Credits: 4**

**Total Lecture Hours: 72**

### **Aim of the course**

To enable the learner to perceive overall idea about environmental studies, different renewable and non-renewable resources. To make students aware of importance of ecosystem and biodiversity and its important role in sustaining life on earth. To help students understand how IT and modern technologies affect ecosystem and various laws related to it.

### **Course Overview and Context**

This course helps to create an awareness about environmental problems among people. This course helps to impart basic knowledge about the environment and its allied problems. This will help in developing an attitude of concern for the environment. It motivates public to participate in environment protection and environment improvement. This course acquires skills to help the concerned individuals in identifying and solving environmental problems. This is a lesson for striving to attain harmony with Nature.

### **Syllabus Content**

**Module I: (18 hrs)**

**Multidisciplinary nature of environmental studies:** Definition, scope and importance, Need for public awareness.

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems,

changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles.

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

## **Module II: (26 hrs)**

**Biodiversity and its conservation:** Introduction, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India (8 hrs)

Environmental Pollution :Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes., Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides. (8 hrs)

Social Issues and the Environment: Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns.

Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies, Consumerism and waste products, Environment Protection Act , Air ( Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

**Module III:** (10 hrs)

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, opens access publishing models, Introduction to use of IT in teaching and learning -Educational software, Academic services– INFLIBNET, NPTEL, NICNET, BRNET .

**Module IV:** (10 hrs)

IT & Society- issues and concerns- digital divide, IT & development, the free software movement , IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones. e-wastes and green computing, impact of IT on language & culture-localization issues- Unicode- IT and regional languages, Green Computing Concept.

**Module V:** (8 hrs)

Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

Human Rights and United Nations – contributions, main human rights related organs - UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities

Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthuriengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc.

### Competencies of the course

On successful completion of this course a learner will:

- Clarify modern environmental concept like how to conserve biodiversity.
- Know the more sustainable way of living.
- Know how to use natural resources more efficiently.
- Know the behaviour of organism under natural conditions.
- Know the interrelationship between organisms in populations and communities.
- Be aware of and educate people regarding environmental issues and problems at local, national and international levels.

### References:

- “Technology in Action” Alan Evans, Kendall Martin, Mary Anne Poatsy, Pearson
- Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses. University Press, IInd Edition 2013 (TB)
- Clark.R.S., Marine Pollution, Clarendon Press Oxford (Ref)
- Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)
- Dc A.K.Environmental Chemistry, Wiley Eastern Ltd.(Ref)
- Down to Earth, Centre for Science and Environment (Ref)
- Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)
- Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)
- Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)
- Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
- Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)
- Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)

- Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, Vol I and II, Enviro Media (Ref)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)
- Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)
- M-Magazine, R-Reference TB- Text Book

**BLUE PRINT**

**Code: BCA5B17B18**

**Course Title: IT, Environment & Human Rights**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	18	3	2	1
2	26	4	4	1
3	10	2	1	1
4	10	2	1	1
5	8	1	1	0

**BCA – CT & ISM (C.B.C.S.S) EXAMINATIONS**

**MODEL QUESTION PAPER**

**V SEMESTER - CORE**

**BCA5B17B18 : IT, ENVIRONMENT & HUMAN RIGHTS**

**Time: 3Hrs**

**Maximum Marks: 80**

**Part A**

**Answer any 10 questions. Each question carries 2 marks.**

1. Define Environment?
2. Write the components of environment?
3. Define deforestation?
4. Define Surface water
5. Define Ecosystem?
6. Define Food chain?
7. What are the 4 kinds of diversity?
8. What is Internet?
9. Define Cyber Space.
10. Define Threats.
11. Define E-waste.
12. What is meant by acid rain?

(10 x 2 =20)

**Part B**

**Answer any 6 questions each not exceeding *two* pages. Each question carries 5 marks:**

13. Mention any two awareness programme of environmental issues to student?
14. Define Surface water.
15. What do you mean by desertification?
16. Give the characteristic features of desert ecosystem?
17. Distinguish between food chain and food web?
18. What are consumers?
19. What is the significance of Academic Search techniques?
20. List a few Cyber Crimes, its IT Act sections and punishments.
21. List the types of solid wastes.

(6 x 5=30)



**Part C**

**Answer any 2 question . Each question carries 15 marks:**

22. Explain how forest is exploited?
23. Explain the energy flow in an eco system? What is an energy cycle?
24. Explain the Role of Internet in Academics.
25. Brief different issues that can arise due to improper use of Internet with solutions.

(2 x 15=30)

**Semester: V**

**Course Code: BCA5B18B18**

**Name of the course: CRYPTOGRAPHY FUNDAMENTALS**

**Duration:** One semester

**Credits:** 4

**Total Lecture Hours:** 72

### **Aim of the course**

To enable learner to familiarize with the basics of encryption and decryption techniques in cryptography also giving him a broad picture of an idea related to the key management and distribution features along with the objective of providing a strong understanding on the implementation of Cryptographic functions.

### **Course Overview and Context**

Primarily our Module throws light on the three building blocks of Information Security viz., Confidentiality, Integrity and Availability and explains how the concept of cryptography and its practices will enable the organizational business to protect confidentiality and Integrity of data. In order to know the nuances of cryptographic technology the Module focuses on the different types of hash and Crypto/Hash Algorithms such as (DES, RSA, SHA, MD5, HMAC, DSA) that will help the Organization to choose an appropriate solution based on the Business and Regulatory requirements.

The Module emphasizes the need of understanding the Key management and the technology used to implement for achieving a well defined encryption and decryption policy. It also covers the underlying vulnerabilities in today's widely used cryptographic functions and the precautionary measures while using the function. Conclusively, The Module helps the learner to understand the importance of Certifying Authority, Public Key Infrastructure and the System requirements for implementing Cryptographic functions.

### **Syllabus Content**

**Module I:** (10 hrs)

**Introduction to Cryptography:** The Confidentiality, Integrity & Availability (CIA) Triad, Cryptographic concepts, methodologies & practices, Symmetric & Asymmetric cryptography, public & private keys.

**Module II:** (15 hrs)

**Cryptographic Algorithms:** Cryptographic algorithms and uses, Construction & use of Digital signatures, The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography & Quantum Cryptography.

**Module III:** (15 hrs)

**Key Management:** The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery and life span and how these functions affect cryptographic integrity

**Module IV:** (16 hrs)

**Application of Cryptography:** Major key distribution methods and algorithms including Kerberos, ISAKMP etc.

**Module V:** (16 hrs)

**Vulnerability analysis:** Vulnerabilities to cryptographic functions.

Use and functions of Certifying Authorities (CAs), Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions.

**Competencies of the course**

On successful completion of this course a learner will:

- Understand the methodology, Practices and uses in Cryptography
- Describe the Various Hash/Crypto Algorithms
- Understand the Key management Principles
- Analyze the importance of PKI and Certificate Authority

**Text Books:**

- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1sted; 2008
- Cryptography and Security by C K Shyamala, N Harini and Dr T R Padmanabhan, Wiley India, 1sted; 2011

- Cryptography and Network Security by AtulKahate, McGraw Hill India, 3rded; July 2017
- Cryptography and Network Security by S. Bose, Pearson India, 1sted; Mar 2016
- Cryptography and Information Security by V. K. Pachghare, Prentice Hall India, 2nd rev ed; 2015

**Reference Books:**

- Understanding Cryptography: A Textbook for Students and Practitioners Hardcover, Springer, 1sted; 2010
- Introduction to Modern Cryptography by Jonathan Katz, Chapman & Hall/CRC Cryptography, 2nded; 2014
- Everyday Cryptography: Fundamental Principles & Applications by Keith Martin, OUP Oxford, 2nded; 2017

**BLUE PRINT**

**Code: BCA5B18B18**

**Course Title: Cryptography Fundamentals**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	10	4	1	0
2	15	2	2	1
3	15	2	2	1
4	16	2	2	1
5	16	2	2	1

**Semester: V**

**Course Code: BCA5B19B18**

**Name of the course: COMPUTER FORENSICS AND INVESTIGATION**

**Duration: One Semester**

**Credits: 3**

**Total Lecture Hours: 72**

### **Aim of the course**

To enable the learner to perceive overall about the computer Forensics, how the Storage Devices & Data Recovery Processes, deep explanation about Forensics techniques and it also gives you the Basics of Cyber Law.

### **Course Overview and Context**

The Module concentrates on the essentials of computer Forensics, how Cyber Crime forms and the First Responder procedures like Technical Staff, Non-Technical Staff, Forensics Expert and Computer Investigation Procedure.

The Module also deals with Storage Devices and the Data Recovery Medium. It also explains about the Forensics techniques like Windows, Linux, Mobile, Stegnography and the application password cracking methods like Brute-Force, Dictionary Attack, Rainbow Attack and the Tracking process of E-mails with various header types such as SMTP, POP3 & IMAP.

The Module give a brief notes to know about the Cyber Law like major characteristics of IT Act 2008, Corporate Espionage, Evidence handling procedures & Chain of custody.

### **Syllabus Content**

#### **Module I: (10 hrs)**

Understand the Importance of Computer Forensics.

**Computer Forensics:** Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure

**Module II:** (15 hrs)

Learn to identify and trace Passwords, E-mail using Forensics Tools.

Storage Devices & Data Recover Method, Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, Head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques

**Module III:** (15 hrs)

Acquire skills to perform how Data works on Storage Devices & the Recovery Devices.

Forensics Techniques: Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – Header option of SMTP, POP3, IMAP.

**Module IV:** (16 hrs)

Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment)

**Module V:** (16 hrs)

Gain Knowledge about Cyber Laws. Cyber Law sections.

**Competencies of the course**

On successful completion of this Module a learner will:

- Understand the Importance of Computer Forensics.
- Learn to identify and trace Passwords, E-mail using Forensics Tools
- Acquire skills to perform how Data works on Storage Devices & the Recovery Devices.
- Gain Knowledge about Cyber Laws

**Text Books:**

- Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1sted; 2015
- Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1sted; 2016
- The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nded; 2014

- Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing - an imprint of LexisNexis; First 2017 edition
- Network Forensics: Tracking Hackers Thru by Davidoff, Pearson India, 1sted; 2013

**Reference Books:**

- Hacking Exposed Computer Forensics by Aaron Philipp, David Cowen, McGraw Hill, 2nded; 2009
- Mastering Mobile Forensics by Soufiane Tahiri, Packt Publishing, 1sted; 2016
- Computer Forensics: A Beginners Guide by David Cowen, McGraw Hill, 1sted; 2013
- Practical Digital Forensics Kindle Edition by Richard Boddington, Packt Publishing, 1sted; July 2016
- Learning Network Forensics by Samir Datt, Packt Publishing, 1sted; 2016

**BLUE PRINT**

**Code: BCA5B19B18**

**Course Title: Computer Forensics and Investigation**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	10	4	1	1
2	15	2	2	1
3	15	2	2	1
4	16	2	2	1
5	16	2	2	0

**Semester: V**

**Course Code: BCA5B20B18**

**Name of the Course: LINUX ADMINISTRATION**

**Duration: One Semester**

**Credits:3**

**Total Lecture Hours: 72**

**Aim of the course:**

To enable the learners to attain the skills required to manage and administer systems and servers using Linux Operating System. The operating system used for this Module is Red Hat Enterprise Linux (RHEL)

**Course Overview and Context:**

RHEL is a high performing operating system that is a long term and predictable operating platform. With the flexibility to deploy on physical hardware, as a virtual host, as a virtual guest or in the cloud, Red Hat Enterprise Linux is the ideal foundation for next-generation datacenters. The fresh system administrators need to have a strong functional knowledge of RHEL in any current IT work environment. The Module explores the security and network access controls in Linux, organizing network system and File System, Securing Data and Account Management

**Syllabus Content:**

**Module I: (10 hrs)**

**Fundamentals of Linux:** Development of Linux, Linux Distributions. Structure of Linux Operating System, Logging In and General Orientation, The X Window System, KDE, GNOME. Navigating the File Systems, Managing Files, File Permission and Access, Shell Basics, Shell Advanced Features, File Name Generation. Common Unix commands

**Module II: (15 hrs)**

**Administration of Linux OS:** Installing Linux, Configuring Disk Devices, Creating and Managing File Systems, File System Backup, Kickstart Installation, Linux Boot Loaders, Linux Kernel Management, Managing User Accounts, Understanding File Listing, Ownership and



Permission, Managing Software using RPM, Connecting to Network, Linux Network Services, Setting up a Printer

**Module III:** (15 hrs)

**Input and Output Redirection:** Input Redirection, Output Redirection, Error Redirection, Filter, Pipes. Networking in Linux: Network Connectivity, IP address, Accessing Remote system, Transferring files, and Internet configuration. Process Control: Identifying Process, Managing Process, Background Processing, Putting jobs in Background. Offline File Storage: Storing files to Media Booting process and User

**Module IV:** (16 hrs)

**Linux Basic networking and naming service:** Introduction to Networking, Networking, Internet Network Services, Dynamic DNS, Electronic Messaging, Apache , NIS and Network File Sharing: NIS, Network File Sharing, SAMBA. Security: Defining System Security Policies, System Authentication Services and Security, Securing Services, Securing Data and Communication

**Module V:** (16 hrs)

**The Unix File System:** Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.

**Competencies of the course:**

- Understand the fundamentals of Linux
- Understand the administration of the OS like backup, user administration
- Implement Network System, NFS, SAMBA and Web Services in Redhat Linux
- Knowledge of file system

**Text Books:**

- Red hat Linux Administration By Michael Turner and Steve Shah-McGraw-Hill Companies, Inc Publisher, 2010
- Redhat Fedora linux for Dummies By NabaBarkakati-Wiley Publishing, Inc, 2011

**References:**

- RHCSA/RHCE Red Hat Linux Certification Study Guide (Exams EX200 & EX300), 6th Edition (Certification Press) [Paperback], Michael Jang, McGraw-Hill Osborne Media; 6 edition (June 17, 2011)

**BLUE PRINT**

**Code: BCA5B20B18**

**Course Title: Linux Administration**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	10	4	1	0
2	15	2	2	1
3	15	2	2	1
4	16	2	2	1
5	16	2	2	1

**Semester: 5**

**Course Code: BCA5BP05B18**

**Name of the course: SOFTWARE LAB-V**

**Credits: 2**

**I. LINUX ADMINISTRATION – LAB (2 hrs per week)**

**Syllabus Content:**

1. Shell script for command line file browsing.
2. Setting and Changing File permissions
3. Managing Users and Groups
4. Setting up shared directories
5. Creating Symbolic and hard links to files
6. Configure your system that boots to run level 3 by default.
7. Devise a ps command that does the following. (Hint: sort/ps/top)
  - (a) List all processes.
  - (b) For each process, prints the information which displays the percentage of CPU usage, the process ID & name of the command that created it.
  - (c) The output is sorted by the %cpu value from highest to lowest
9. Explain the suid, sgid & sticky bit permission with example
10. Configure given tasks for package management: (Hint: use rpm command)
  - (a) Check whether ftp package is installed or not.
  - (b) If it is not installed, install it & verify it.
  - (c) Display the configuration files available through this package.
  - (d) Be sure that ftp service must be enabled at startup.
11. Prepare a cron job that take the backup of /home at 5:00pm on every Saturday.
12. Change your system date to 1:00pm March 1990.
13. Configure ftp server such that anonymous can download and upload the data to ftp server.
14. Create a RAID level 1 on /dev/md0 device by creating two equal partitions of 100MB size and mount it on /data. The RAID device must be mounted at the time of system startup.

## **II. COMPUTER FORENSICS AND INVESTIGATION - LAB (3hrs per week)**

### **Syllabus content:**

#### **Module 1**

Understand the Physical Collection of electronic evidence using forensic standards and to gain knowledge about the Dismantling and re-building PCs in order to access the storage media safely

#### **Module 2**

To know about Boot sequence and Power OnSelf Test mode analysis and to understand about the Examination of File systems of Windows, Linux and Mac

#### **Module 3**

To gain knowledge about the Analysing Word processing and Graphic file format and to understand the basic Network data sniffing and analysing

#### **Module 4**

To know about the Password and encryption techniques and get enough skills how to perform Internet forensic and Malware analysis

#### **Module 5**

To know on how Data recovery techniques for hard drive and attain skills of how to execute Data recovery techniques for Pen drive and CD

### **Scheme of Evaluation for software lab III external is as follows:**

(There will be two questions, the first from Linux Administration and second from Computer Forensics)

### **Division of Marks (Practical - 3 hours External)**

First questions from Linux Administration Lab - 25 marks

1. Logic – 10 marks
2. Successful compilation – 8 marks
3. Result – 7 marks

Second questions from Computer Forensics Lab - 35 marks

1. Logic – 20 marks
2. Successful compilation – 10 marks
3. Result – 5 marks

Viva Voce - **10 marks**

Lab Record - **10 marks**

(Computer Forensics - Minimum of 10 Programs

Linux Administration – Minimum of 15 Programs )

**Total Marks**

**- 80 marks**

**Semester 6**

**Course Code: BCA6B21B18**

**Name of the Course: IT GOVERNANCE, RISK, & INFORMATION SECURITY  
MANAGEMENT**

**Duration:** One Semester

**Credits:** 4

**Total Lecture Hours:** 72

**Aim of the course**

To enable learners to understand the overview of IT Governance. To familiarize with the Information Systems & Strategies, Risk Management Program and also the Information Security Management.

**Course Overview and Context**

The Module primarily covers the Introduction, Concepts, Role of Governance in Information Security, Best Practices on Role of IT Strategy Committee, Standard IT Balancing Scorecard, Val-IT framework of ISACA. The Module also deals with the Role of Strategies planning for IT, Role of Steering Committee and their policies with procedures. The Module covers the development of whole Risk Management Program & Process with Risk Analysis methods and about ISACA.

The Module also explains the Introduction to Information Security management, Performance Optimization, IT Security-roles & responsibilities, Segregation of Duty, Frameworks like COBIT.

**Syllabus Content**

**Module I:** (16 hrs)

**IT Governance:** Introduction & Concepts, Role of Governance in Information Security, Best Practices for IT Governance Role of IT Strategy Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA

**Module II:** (14 hrs)

**Information Systems Strategy:** Role of Strategic Planning for IT, Role of Steering committee, Policies and Procedures

**Module III:** (16 hrs)

**Risk Management Program:** Develop a Risk Management Program. Risk Management Process, Risk Analysis methods

**Module IV:** (12 hrs)

**Information Security Management:** Introduction, Performance Optimization, IT Security roles & responsibilities, Segregation of Duties.

**Module V:**(14 hrs)

**Frameworks – ISACA, COBIT:** Risk-IT Framework of ISACA, Description of COBIT and other Frameworks

**Competencies of the course**

On successful completion of this Module a learner will:

- Acquire Knowledge about IT and IS Governance
- Gain Exposure on Risk management and Risk –IT framework
- Understand the Importance Roles and segregation of Duties
- Get introduced to COBIT framework and VAL-IT of ISACA

**Text Books:**

- Information Security Governance by S.H. Solms, Rossouw Solms, Springer; 1st Edition. 2nd Printing, 2008 edition (12 December 2008)
- IT Governance: How Top Performers Manage IT Decision Rights for Superior Results by Weill, Harvard Business Review Press; First edition (1 June 2004)
- ISACA publications

**Reference Books:**

- Managing Risk and Information Security by Malcolm Harkins, Apress; 1 edition, 2012
- IT Governance: An International Guide to Data Security and ISO27001/ISO27002 by Alan Calder, Steve Watkins, Kogan Page; 6 edition (3 September 2015)
- ISACA publications on COBIT, RiskIT and ValIT
- Information Security Governance: Guidance for Information Security Managers by W. Krag Brotby and IT Governance Institute, Isaca (2 June 2008)

- COBIT 5 Framework Perfect by Isaca, (10 April 2012)
- Cobit 5 Foundation-reference and Study Guide by Ana Cecilia Delgado, CreateSpace Independent Publishing Platform; Stg edition (20 June 2016)
- Governance of Enterprise IT Based on COBIT 5: A Management Guide by Geoff Harmer (Author), IT Governance Publishing, (6 February 2014)

**BLUE PRINT**

**Code: BCA6B21B18**

**COURSE TITLE: IT Governance, Risk & Information Security Management**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	16	3	2	1
II	14	2	2	1
III	16	3	2	1
IV	12	2	1	-
V	14	2	2	1



**Semester:** 6

**Course Code:** BCA6B22B18

**Name of the course:** MOBILE, WIRELESS AND VOIP SECURITY

**Duration:** One semester

**Credits:** 4

**Total Lecture Hours:** 72

### **Aim of the course**

The main aim of this Module is to provide the introduction to Mobile Communications, how to secure the Wireless protocols & VoIP protocols and its vulnerabilities. It also gives detail descriptions over Mobile Forensics & how to extract data from it.

### **Course Overview and Context**

The Module concentrates on the basis of Mobile & Telecommunication Protocols along vulnerabilities to get knowledge and how on managerial, technical, procedural controls of Mobile & Telecommunication Vulnerabilities.

The Module also explains about managerial, technical & procedural controls to address Wireless Vulnerabilities, VoIP Vulnerabilities.

The Module covers Mobile Forensics process having Seizure and the data extraction types like physical, logical and manual along external & internal memory, storage, analysis using tool & techniques.

### **Syllabus Content**

**Module I:**(18 hrs)

**Introduction to Mobile communication:** Mobile & Telecommunication protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Mobile & Telecommunication vulnerabilities

**Module II:** (18 hrs)

**Wireless Security:** Wireless protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Wireless vulnerabilities

**Module III:** (18 hrs)

**Voice over Internet Protocol (VOIP) Security:** VOIP concepts, protocols and vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address VOIP vulnerabilities

**Module IV:** (18 hrs)

**Mobile Forensics & Data Extraction:** Mobile forensics process including seizure, data acquisition types like Physical, Logical, Manual, External & Internal memory, storage, analysis using tools & techniques

**Competencies of the course**

On successful completion of this Module, the learner will

- Understand about the Mobile Communication
- Understand about the Wireless Security
- Understand about the VoIP Security
- Learn to identify Mobile Forensics & to handle how to extract data

**Text Books:**

- Mobile Application Security by Himanshu Dwivedi, Chris Clark, David Thiel by McGraw Hill Education (1 July 2017)
- Wireless Network Security A Beginner's Guide by Tyler Wrightson, McGraw Hill Education; 1 edition (25 June 2012)
- Mobile Security: How to Secure, Privatize and Recover Your Devices Paperback by Tim Speed, Darla Nykamp, Mari Heiser, Joseph Anderson, Packt Publishing Limited (10 August 2013)
- Mastering Mobile Forensics by Soufiane Tahiri, Packt Publishing Limited (30 May 2016)
- Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)

**Reference Books:**

- Mobile Forensics: Advanced Investigative Strategies by Oleg Afoninis, Vladimir Katalov, Packt Publishing Limited (30 September 2016)
- Practical VoIP Security by Thomas Porter, Syngress (31 March 2006)
- The Mobile Application Hacker's Handbook (MISL-WILEY) by Dominic Chell, Tyrone Erasmus, Shaun Colley, Wiley (2015)
- Wireless Hacks 2e by Rob Flickenger, Roger Weeks, O'Reilly; 2 edition (9 December 2005)
- Network Security Bible by Eric Cole, Wiley; Second edition (2009)
- Security Aspects for Voip Systems by Alotaibi Mutlaq, LAP Lambert Academic Publishing (28 May 2015)

**BLUE PRINT**

**Code: BCA6B22B18**

**COURSE TITLE: Mobile, Wireless & VOIP security**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	18	3	2	1
II	18	3	2	1
III	18	3	3	1
IV	18	3	2	1

**Semester: 6**

**Course Code: BCA6B23B18**

**Name of the Course: INTRODUCTION TO WINDOWS AZURE**

**Duration:** One Semester

**Credits:** 4

**Total Lecture Hours:** 72

**Aim of the course:** To introduce the course to the students as a first time information to ensure that the students are aware of the mostly used features.

**Course Overview and Context:** The course seeks to cover the holistic perspective of Windows Azure on infrastructure perspective. How this service can be used by different services.

**Syllabus Content:**

**Module I:** (14 hrs)

**Introduction:** Introduction to MS. Azure, Virtual Machines: Creating Virtual Machines, Difference Between Basic and Standard VMs, Logging in to a VM and Working, Attaching an empty Hard Disk to VM, Hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM, Creating a VM from a custom Image, Shut down VM without Getting Billed, VM Pricing

**Module II:** (16 hrs)

**Managing Infrastructure in Azure:** Managing Infrastructure in Azure: Azure Virtual Networks, Highly Available Azure Virtual Machines, Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. Load Balancing: Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer.

**Module III:** (16 hrs)

**Windows Azure:** Azure Storage: What is a Storage Account, Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control Automation: Introduction Windows Power Shell , Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script.

**Module IV:** (14 hrs)

**SQL Azure:** Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Tables, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.

**Module V:** (12 hrs)

**Websites:** Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between Free, Shared, Basic and Standard websites, Creating a website using Visual studio

**Competencies of the course:**

- Get acquainted with the Microsoft Azure
- Learn how to create a virtual machine
- Acquire knowledge about virtual networking in Azure
- Learn how to create load balancer, clusters etc
- How to use SQL in Azure
- How to create and manage website in Azure

**Text Book:**

- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

**Reference Books:**

- Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
- Windows Azure Step By step by Roberto Brunetti.

**BLUE PRINT**

**Code: BCA6B23B18**

**Course Title: Introduction to Windows Azure**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	14	2	2	1
II	16	3	2	1
III	16	3	2	1
IV	14	2	2	1
V	12	2	1	0

**Semester: 6**

**Course Code: BCA6BXB18**

**Name of the Course: SEMINAR (CORE)**

**Duration: One Semester**

**Credits: 2**

**Seminar Presentation: 2 Hrs/week**

**Seminar Presentation:**

Each student can choose a latest topic of current day interest in the areas of Computer Science / Information Technology and present a seminar presentation using appropriate presentation media. A seminar presentation report in bound form in the pattern of a complete technical report (with contents page, well-structured presentation, references etc.) should be submitted. There will not be any external evaluation for Seminar Presentation.

**Scheme of Evaluation of Seminar Presentation (core) for INTERNAL is as follows:**

**Division of Marks**

Seminar Presentation Internal (100 marks)

Presentation - 40 marks

Discussion (Questions and Answers ) - 30 marks

Documentation -10 marks

Seminar report with proper Content  
and Binding - 20 marks

**Total Marks -100 marks**

**Semester: 6**

**Course Code: BCA6BPRB18**

**Name of the Course: PROJECT (CORE)**

**Duration: One Semester**

**Credits: 3**

**Total Hrs: 126**

**Individual project.**

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms, so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

**Scheme of Evaluation for Project external is as follows:**

**Division of Marks (Project)**

Project demonstration and Presentation	<b>- 40 marks</b>
Viva related to project	<b>- 20 marks</b>
Project report with proper content and binding	<b>-20 marks</b>
<b>Total Marks</b>	<b>- 80 marks</b>



**Semester: 6**

**Course Code: BCA6BVB18**

**Name of the Course: VIVA VOCE (CORE)**

**Credit: 1**

**Scheme of Evaluation of Viva voce (core) for External is as follows:**

Each student should attend a course viva voce based on syllabus from semester I to semester IV.

**Total Marks – 100 marks**

**SYLLABI**

**OF**

**OPEN COURSES**

**Semester: V**

**Course Code: BCA5D01aB18**

**Name of the course: SECURITY THREATS AND TRENDS**

**Duration:** One semester

**Credits:** 3

**Total Lecture Hours:** 72

### **Aim of the course**

To enable learners to understand the Introduction for viruses, worms, malware, botnets, trojans, rootkits and also the cyber warfare introduction to advanced persistent threats & information warfare.

### **Course Overview and Context**

The Module provides you to know about the introduction, concepts, various types, technical, managerial and procedural controls to address viruses, worms, malwares, botnets, trojans, rootkits.

This Module also gives you the knowledge about advanced persistent threats, information warfare same as the before topics like working methods, security implications, managerial, technical, procedural controls to address these threats.

### **Syllabus Content**

**Module I:** (12 hrs)

**Understand about the viruses & worms:** Introduction to Viruses & Worms, the concept of how Viruses & Worms work, the various types of Viruses & Worms, the infection vectors of Viruses & Worms, managerial, technical & procedural controls to address Viruses & Worms

**Module II:** (15 hrs)

**Understand about the malware & botnets:** Introduction to Malware & Botnets, the concept of how Malware, Trojans & Botnets work, the concept of Honeynets and Honeypots, Managerial, technical & procedural controls to address Malware, Trojans & Botnets

**Module III:** (15 hrs)

**Understand about the trojans & rootkits:** Introduction to Remote Access Trojans & Rootkits, concepts, their working methods, their security implications and the managerial, technical and procedural controls to address RATs

**Module IV:** (15 hrs)

**Learn to identify the advanced persistent threats & threat warfare:** Introduction to Advanced Persistent Threats & Information Warfare, concepts, their working methods, their security implications and the managerial.

**Module V:** (15 hrs)

**Learn how to address threats and possible attacks:** Technical and procedural controls to address these threats

**Competencies of the course**

On successful completion of this Module, the learner will be able to

- Understand about the viruses & worms
- Understand about the malware & botnets
- Understand about the trojans & rootkits
- Learn to identify the advanced persistent threats & threat warfare

**Text Books:**

- Future Crimes: Inside the Digital Underground and the Battle for Our Connected World by Marc Goodman, Corgi; Latest Edition edition (1 March 2016)
- Threat Modeling: Designing for Security (MISL-WILEY) by Adam Shostack, Wiley, 2014
- Cyber War: The Next Threat to National Security and What to Do About It by Richard A. Clarke, Robert Knake, Ecco; Reprint edition (10 April 2012)
- Cyber Terrorism and Information Warfare by M. N. Sirohi, Alpha Editions; 1 edition (22 May 2015)
- Windows Malware Analysis Essentials by Victor Marak, Packt Publishing Limited (31 August 2015)
- Cuckoo Malware Analysis by Digit Oktavianto, Iqbal Muhandianto, Packt Publishing Limited (20 September 2013)
- Tools and Techniques for Fighting Malicious Code: Malware Analyst's Cookbook by Michael Hale Ligh, Steven Adair, Blake Hartstein, Matthew Richard, Wiley (2010)
- Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)

- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008

**Reference Books:**

- Advanced Persistent Threat: Understanding the Danger and How to Protect Your Organization 1st , Kindle Edition by Eric Cole, Syngress; 1 edition (31 December 2012)
- Advanced Persistent Threat Hacking: The Art and Science of Hacking Any Organization by Tyler Wrightson, McGraw-Hill Education (16 September 2014)
- Darkweb Cyber Threat Intelligence Mining by John Robertson, Ahmad Diab, Ericsson Marin, Eric Nunes, Cambridge University Press; 1 edition (4 April 2017)
- The Evolution of Cyber War: International Norms for Emerging-Technology Weapons by Brian Mazanec, Potomac Books Inc (1 November 2015)
- Practical Malware Analysis – The Hands–On Guide to Dissecting Malicious Software by Michael Sikorski, Andrew Honig, No Starch Press; 1 edition (22 February 2013)

**BLUE PRINT**

**Code: BCA5D01aB18**

**Course Title: Security Threats and Trends**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	12	4	1	1
2	15	2	2	1
3	15	2	2	1
4	15	2	2	1
5	15	2	2	0

**Semester: V**

**Course Code: BCA5D01bB18**

**Name of the course: HACKTIVISM, CYBERWARFARE AND CYBERTERRORISM**

**Duration:** One semester

**Credits:** 3

**Total Lecture Hours:** 72

**Aim of the course:**

To enable learners to understand about the essentials of Hacktivism, Cyber warfare, Cyber terrorism. The learners can also know about the current trends in Hacktivism and also the nature of cyber warfare and finally about the Defensive measures.

**Course Overview and Context:**

The Module explains the introduction, impact of Hacktivism, cyber warfare, cyber terrorism etc., the types & economic impact of information warfare.

The learners come to know about the current trends in hacktivism having wiki leaks, anonymous, lulz movements and political nature of Hacktivism how the players involved in it. Current trends and defensive strategies for private companies ruining those.

The Module specifies the 5 types of modern warfare including cyber warfare, nature, CAN, CNE and how they both deploy, new cyber warfare models, current trends, cyber terrorism and finally the recent incidents.

Learners finally know about the defense in Depth and real life samples like network defense and the nefarious attacks of network and defense tools.

**Syllabus Content:**

**Module I:** (12 hrs)

**Introduction of Hacktivism, Cyber warfare & cyber terrorism:** Introduction to Hacktivism, Cyber warfare and Cyber terrorism, Define Hacktivism, Define Cyber warfare, Define Cyber terrorism, Impact of hacktivism, cyber warfare and cyber terrorism to society and business. Types of Information warfare strategies and activities, Economic Impact of Information warfare

**Module II:** (15 hrs)

**Gain knowledge about the current trends in Hacktivism:** Current Trends in Hacktivism

Current trends in hacktivism including wiki leaks, anonymous and lulz movements, Political natures of Hacktivism, Players involved in hacktivism and discuss the recent incidents, Countermeasures to protect against such incidents. Defensive strategies for Private Companies, Surviving Offensive Ruinous and Containment

**Module III:** (15 hrs)

**To understand about the nature of Cyber warfare:** Nature of Cyber warfare, 5 types of modern warfare including cyber warfare, Strategic nature of cyber warfare, Computer Network Attack (CNA) and Computer Network Exploitation (CNE), How to deploy CNA and CNE assets within a strategic context in support of obtaining a kinetic goal,

**Module IV:** (15 hrs)

**Review history and current trends:** Review historic attacks and learn new cyber warfare models that can be used to analyze a state-sponsored attack, Current trends in Cyber warfare and Cyber terrorism including the players and groups involved, Analyze the resent incidents of Cyber warfare and Cyber terrorism

**Module V:** (15 hrs)

**Learn to identify the Defensive measures:** Defensive measures, Defense in Depth and real life examples of how to apply it to network defense. Why information assurance of computer equipment is critical to defend the network from nefarious attacks. Use Defense tools

**Competencies of the course:**

On successful completion of this Module, the learner will be able to

- To know about the Introduction of Hacktivism, Cyber warfare & cyber terrorism.
- Gain knowledge about the current trends in Hacktivism
- To understand about the nature of Cyber warfare.
- Learn to identify the Defensive measures

**Text Books**

- Cyber security – From Luxury to Necessity by BalajiSrimoolanathan, Pub: Frost & Sullivan, 2011 (Unit I,II)
- Information Warfare and Security (Addison Wesley, 1998) Dorothy E Denning (Unit III)
- Cyberterrorism – The Jihadi Cyberterror Threat – By Dorothy E Denning – Naval Postgraduate school, 2009 (Unit IV)
- Information Warfare – How to survive Cyberattacks – Michael Erbschloe, Osborne/McGraw Hill, 2008 (Unit V)

**BLUE PRINT**

**Code: BCA5D01bB18**

**Course title: Hacktivism, Cyberwarfare and Cyberterrorism**

<b>Modules</b>	<b>Hours</b>	<b>Part A (short answer) 2 marks 10/12</b>	<b>Part B (short essay) 5 marks 6/9</b>	<b>Part C (essay/problem) 15marks 2/4</b>
1	12	2	1	1
2	15	2	2	1
3	15	2	2	1
4	15	4	2	0
5	15	2	2	1



**SYLLABI**

**OF**

**CHOICE BASED CORE**

**COURSES**

**Semester: VI**

**Course Code: BCA6B24aB18**

**Name of the course: VIRTUALIZATION AND CLOUD SECURITY**

**Duration:** One semester

**Credits:** 4

**Total Lecture Hours:** 72

### **Aim of the course**

The main goal of this Module is to give a special knowledge on Virtualization & Cloud computing concepts; also from this you can gain knowledge on cloud security, cloud trust protocols & transparency. It also talks about the cloud control matrix and the top cloud threats.

### **Course Overview and Context**

The Module gives you the knowledge about the Virtualization & Cloud Computing Concepts like private cloud vs. public cloud, IAAS, PAAS & SAAS concepts, it says about the Virtualization security concerns like Hypervisor security, Platform security, security communication, security between guest instance & hosts, guests.

The Module concentrates on Cloud Security like Complete Certificate of Cloud Security Knowledge (CCSK). It also deals with the cloud Trust protocols and transparency with their concepts, security, privacy and compliance aspects of cloud.

The Module finally tries to give out the cloud control matrix and top cloud threats, architecture of cloud initiative and Security as a Service.

### **Syllabus Content**

**Module I:** (12 hrs)

**Introduction to Cloud:** Cloud computing concepts, Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts.

**Module II:** (13 hrs)

**Introduction to Virtualization:** Virtualization concepts, Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between

Guest instances, Security between Hosts and Guests

**Module III:** (16 hrs)

**Cloud Security:** Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol, Cloud Controls Matrix. Complete Certificate of Cloud Security Knowledge (CCSK)

**Module IV:** (16 hrs)

**Cloud Trust Protocol & Transparency:** Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Concepts, Security, Privacy & Compliance aspects of cloud

**Module V:** (15 hrs)

**Cloud Controls Matrix & Top Cloud Threats:** Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model, requirements of Security as a Service model and Top Security threats to the cloud model

### **Competencies of the course**

On successful completion of this Module a learner will

- To understand about the Virtualization & Cloud
- To get knowledge on cloud security
- Gain exposure about cloud trust protocol & transparency
- To get knowledge about how to control cloud matrix and the top cloud threats

### **Text Books:**

- Virtualization Security: Protecting Virtualized Environments by Dave Shackleford, Sybex (4 December 2012)
- OpenStack Cloud Security by Fabio Alessandro Locati, Packt Publishing Limited (28 July 2015)
- Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines, Wiley, 2010
- Cloud Security and Privacy by Mather Tim, Shroff Publishers & Distributers Private Limited - Mumbai; First edition (2009)

**Reference Books:**

- Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler, Syngress (1 June 2011)
- Practical Cloud Security: A Cross-Industry View by Melvin B. Greer Jr., Kevin L. Jackson CRC Press; 1 edition (2 August 2016)
- CCSP (ISC)2 Certified Cloud Security Professional Official Study Guide 1st , Kindle Edition by Ben Malisow (Author)
- [www.cloudsecurityalliance.org](http://www.cloudsecurityalliance.org)

**BLUE PRINT**

**Code: BCA6B24aB18**

**Course Title: Virtualization and Cloud security**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	12	2	2	-
II	13	2	1	1
III	16	3	2	1
IV	16	3	2	1
V	15	2	2	1

**Semester: VI**

**Course Code: BCA6B24bB18**

**Name of the Course: CLOUD WEB SERVICES**

**Duration: One Semester**

**Credits: 4**

**Total Lecture Hours: 72**

**Aim of the course:** Is to educate the students about the web service via the AMAZON WEB service product.

**Course Overview and Context:**

This course covers the Amazon Web Service in detail about the networking, storage and And security aspect of the most popular Product

**Syllabus Content:**

**Module I: (13 hrs)**

**Introduction to AWS:** Definition of Cloud Computing, IAAS PAAS & SAAS, Private & Public Cloud, AWS Business hierarchy, The AWS Infrastructure, AWS Strategy, AWS Ecosystem, AWS Benefits, AWS Competitors. AWS Management Console: Setting up AWS Account, Accessing AWS Services, S3 Bucket, Case Studies.

**Module II: (15 hrs)**

**AWS Management Console and Security:** AWS Management Console: Setting up AWS Account, Accessing AWS Services, S3 Bucket, Case Studies. Boundaries of Cloud, Security, AWS Security Groups, Security groups for Application Partitioning – Concept, Amazon Virtual Private Cloud.

**Module III: (15 hrs)**

**AWS Storage, Elasticity and AWS Networking:** Amazon Storage, S3 Storage Basics, Managing Voluminous Information with EBS, Glacier Storage Service, AWS Networking: Networking Basics, VLAN Basics, Basics of AWS VLANs, AWS Network IP Addressing and Mapping. Case Studies

**Module IV:** (16 hrs)

**AWS Services:** Cloud Front, Relational Database Service, AWS Service Integration, AWS Platform Services: Cloud Search, Simple Queue Service, Simple Notification Service, Simple Email Services, Simple Workflow Service, AWS Management Services: Managing AWS Applications, Monitoring with Cloud watch, Auto-Scaling in AWS, AWS Cloud Formation, Case Studies

**Module V:** (13 hrs)

**AWS and Applications on Cloud & AWS Costs:** Salient Features of AWS, Cloud Application Designing Principles, AWS Costing, Advantages of Cost Utilization Tracking, working Principles, Managing AWS Costs, Case Studies.

**Competencies of the course:**

- Knowledge about the different types of cloud service
- Knowledge about the different types of cloud
- Storage Service provided by the product
- Features of Cloud application

**Text Books**

- Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011
- Amazon Web Services for Dummies, Bernald Golden, John Wiley & Sons, 2013

**Reference Book**

- Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010

**BLUE PRINT**

**Code: BCA6B24bB18**

**Course Title: Cloud Web Services**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	13	3	2	-
II	15	2	2	1
III	15	2	2	1
IV	16	3	2	1
V	13	2	1	1

**Semester : VI**

**Course Code : BCA6B24cB18**

**Name of the Course: FUNDAMENTALS OF DATACENTER**

**Duration:** One Semester

**Credits:** 4

**Total Lecture Hours:** 72

**Aim of the course:** Is to provide the students the knowledge about data center and its requirements and the features.

**Course Overview and Context:** This course is designed to deliver the relevant knowledge about Data Center including the design in detail with introduction to server Farm and role of Data Center in Disaster recovery and Business continuity management.

**Syllabus Content:**

**Module I:** (15 hrs)

**Overview of Data Centers:** Data Centers Defined, Data Center Goals, Data Center Facilities, Roles of Data Centers in the Enterprise, Roles of Data Centers in the Service Provider Environment, Application Architecture Models. The Client/Server Model and Its Evolution, The n-Tier Model, Multitier Architecture Application Environment, Data Center Architecture.

**Module II:** (15 hrs)

**Data Center Requirements:** Data Center Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe from Natural Hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard



**Module III:** (12 hrs)

**Data Center Design:** Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism,

**Module IV:** (16 hrs)

**Introduction to Server Farms:** Types of server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet data center, corporate data center, software defined data center, data center topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, Data Center Transport Layer, Data Center Services, IP Infrastructure Services, Application Services, Security Services, Storage Services.

**Module V:** (14 hrs)

**Business Continuity and Disaster Recovery fundamentals:** Business continuance infrastructure services, the need for redundancy,, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies .

**Competencies of the course:**

- Overview of the Data Center
- Requirements of Data Centers
- Concepts of Design of the Data Centers
- Knowledge about Server Farms
- Role of Data Center in Business Continuity and Disaster Recovery Management

**Text Book:**

- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

**Reference Books:**

- Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
- Windows Azure Step By step by Roberto Brunetti.

**BLUE PRINT**

**Code: BCA6B24cB18**

**Course Title: Fundamentals of Data Center**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	15	2	2	1
II	15	3	2	1
III	12	3	2	-
IV	16	2	2	1
V	14	2	1	1

**Semester: VI**

**Course Code: BCA6B24dB18**

**Name of the Course: FUNDAMENTALS OF ITIL**

**Duration: One Semester**

**Total Lecture Hours: 72**

**Aim of the course:** All organizations have Mission Vision goals and objectives. IT services play a major role in accomplishing the same. Foundation of IT Service management is Based on ITIL and it is widely accepted as a framework. Aim of the course is to provide with a exposure of the same.

**Course Overview and Context:** In this course students will be provided with the details of the Service lifecycle and its components.

**Syllabus Content:**

**Module I: (14 hrs)**

**ITIL Overview and Service Strategy:** ITIL History, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Overview of HPSM and OTRS as service management tool, Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process, Introduction to ISO 20000 Standards

**Module II: (16 hrs)**

**Service Design:** Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process

**Module III: (16 hrs)**

**Service Transition:** Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management

**Module IV:** (12 hrs)

**Service Operation, Continual Service Improvement:** Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function  
Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfillment Process, The Access Management Process, The Problem Management Process,

**Module V:** (14 hrs)

**Continual Service Improvement:** Continual Service Improvement principles - CSI and organizational change, Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks, models, standards and quality systems  
Continual Service Improvement processes : 7step improvement process, Service reporting, Service management, return on investment for CSI, business questions for CSI, Service level management

**Competencies of the course:**

- Introduction to ITIL
- Understand Service Strategy
- Discuss Service Design
- Familiarize Service Operation
- Evaluate Continual Service improvement

**Text Books:**

- Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010
- HP operation Manual from HP, 2010
- A Guide to Service Desk Concepts Donna Knapp From Cengage Learning, 2010

**Reference Books:**

- The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers, 2008
- Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair John Wiley and Sons, 2008

**BLUE PRINT**

**Code: BCA6B24dB18**

**Course Title: Fundamentals of ITIL**

<b>Modules</b>	<b>Hours</b>	<b>PART A (short answer) 2 marks 10/12</b>	<b>PART B (short essay) 5 marks 6/9</b>	<b>PART C (essay/problem) 15marks 2/4</b>
I	14	2	2	1
II	16	3	2	1
III	16	3	2	1
IV	12	2	1	0
V	14	2	2	1

**SYLLABI**

**OF**

**COMPLEMENTARY COURSES**

**Semester:** I

**Course Code:** ST1C01B18

**Name of the Course:** DESCRIPTIVE STATISTICS

**Duration:** One Semester

**Credits:** 3

**Total Lecture Hours:** 72

**Aim of the course:** Is to provide the relevant knowledge to the students to introduce the basic concepts in Statistics and to develop data reduction techniques.

**Course Overview and Context:** This course covers the basics of statistics. The idea is to provide the students with the basic understanding of the subject.

**Syllabus Content:**

**Module I** (12 hrs)

Introduction to Statistics, Population and Sample, Collection of Data, Various methods of data collection, Census and Sampling Methods of Sampling – Simple Random Sampling– stratified sampling – systematic sampling (Method only), Types of data – quantitative, qualitative, Classification and Tabulation, Frequency Table, Diagrammatic representation – Bar diagram, pie diagram; pictogram and cartogram.

**Module II** (20 hrs)

Measures of Central Tendency – Mean; Median; Mode; Geometric Mean; Harmonic Mean and Properties, Partition values- Quartiles, Deciles, Percentiles, Absolute and Relative measures of Dispersion – Range, Quartile Deviation, Box Plot, Mean Deviation, Standard Deviation, Coefficient of Variation.

Graphical representation – histogram; frequency polygon; frequency curve; ogives and stem and leaf chart.

**Module III** (20 hrs)

Raw Moments, Central Moments, Inter Relationships (First Four Moments), Skewness – Measures – Pearson's, Bowley's and Moment Measure; Kurtosis- Measures of Kurtosis – Moment Measure, Measure based on partition values.

**Module IV** (20 hrs)

Index Numbers – definition, Simple Index Numbers; Weighted Index Numbers – Laspeyer’s Paasche’s and Fisher’s Index Numbers, Test of Index Numbers, Construction of Index Numbers, Cost of Living Index Numbers – Family Budget Method, Aggregate Expenditure Method.

**Competencies of the course:**

- Understand data collection method
- Understand sampling method
- Analyze different types of DATA
- Determining Central tendency
- Understand index numbers

**Text Books**

- S.P. Gupta: Statistical Methods (Sultan Chand & Sons Delhi).
- S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
- B.L. Agarwal: Basic Statistics, New Age International (P) Ltd.
- Parimal Mukhopadhy: Mathematical Statistics, New Central Book Agency (P) Ltd, Calcutta
- Murthy M.N.: Sampling theory and Methods, Statistical Publishing Society, Calcutta.

**BLUE PRINT**

**Code: ST1C01B18**

**COURSE TITLE: DESCRIPTIVE STATISTICS**

<b>Modules</b>	<b>Hours</b>	<b>PART A- (short answer) 2 marks 10/12</b>	<b>PART B- (short essay) 5 marks 6/9</b>	<b>PART C- (essay/problem) 15marks 2/4</b>
I	12	3	2	0
II	20	3	3	1
III	20	4	2	1
IV	20	2	2	2



**BCA – CT & ISM (C.B.C.S.S) EXAMINATIONS**

**MODEL QUESTION PAPER**

**I SEMESTER - COMPLEMENTARY**

**ST1C01B18: DESCRIPTIVE STATISTICS**

**Time: 03 Hours**

**Maximum Marks: 80**

**Part A (Short Answer Questions)**

Answer any *ten* questions

Each question carries 2 mark.

1. Define the terms Central tendency and Dispersion.
2. Define Mean deviation.
3. What are raw moments and central moments?
4. The first two moments of a distribution about  $X = 4$  are 1 and 4. Find the mean and variance.
5. What is commodity reversal test ?
6. Give the sources of secondary data.
7. Distinguish between Census and sample survey.
8. What is Kurtosis? Give the measure of Kurtosis in common use.
9. Find the standard deviation of the numbers 7,9,16,24,26
10. If  $\sum P_k = 360$ ,  $\sum P_o = 300$  find the simple aggregate Index number.
11. What are different methods of collecting primary data?
12. What are relative and absolute measures of dispersion?

**(10x2=20marks)**

**Part B (Brief Answer Questions)**

Answer any *six* questions.

Each question carries 5 marks.

13. Examine whether Laspeyer's Index number satisfies Factor reversal test.
14. Evaluate Arithmetic mean as a measure of central tendency.
15. Explain Box Plot
16. What is Sheppard's correction? What will be the correction for first four central moments?

17. Find Mean, Median and using the Empirical relation find Mode.

X:	4	8	12	16	20	24
F:	2	7	15	11	9	6

18. Evaluate Standard deviation as a measure of dispersion.

19. For a distribution the Mean is 10, Variance is 16,  $\beta_1 = 1$  ,  $\beta_2 = 4$ , Obtain the first four moments about 0

20. Explain the various steps involved in the Construction of an Index Number

21. Compare Census and Sampling.

**(5x6 = 30 marks)**

**Part C (Essay Questions)**

Answer any *two* questions.

Each question carries 15 marks.

22. Explain different tests to be satisfied by a good index number.

23. An Analysis of monthly wages paid to workers in two firms A and B belonging to the same Industry, gives the following results.

	Firm A	Firm B
No. Of wage earners	550	650
Average monthly wages	50	45
Variance of the distribution of wages	90	120

(a) Which firm A or B pays out larger amount as monthly wages?

(b) In which firm A or B is there greater variability in Individual wages ?

(c) What are the measures of average and Standard deviation of monthly wages of all the workers in the two firms taken together ?

24. Calculate Laspeyer’s , Paasche’s and hence Fisher’s Index numbers for the following data.

Commodity	Price(Rs per Module)		Quantity (Kg)	
	Base year	Current year	Base year	Current year
A	20	30	12	18
B	30	42	10	14
C	22	34	6	10
D	18	28	8	12

25. (a) Show that  $\beta_2 > 1$  for a Discrete distribution.

(b) Calculate Pearson's Coefficient of Skewness for the following distribution

Variable	0-5	5-10	10-15	15 – 20	20 – 25	25 -30	30-35
Frequency	3	5	9	15	21	10	7

**(2x15 = 30 marks)**

**Semester : II**

**Course Code : MT2C04B18**

**Name of the Course: Fundamentals of Mathematics**

**Duration : One Semester**

**Credits: 4**

**Total Lecture Hours: 72**

### **Aim of the Course**

The aim of this course is to provide an in-depth understanding of operations on matrices, limits, differential equations and associated concepts.

### **Course Overview and Context :**

This course promotes the methods and benefits of mathematical thoughts and logical understandings. So as to use the concepts in computer applications

This course mainly focuses on study of first order differential equation , partial differential equation, Laplace transforms , limit of functions, matrices etc. The learners will obtain problem solving skills and logical perspectives through this course

### **Syllabus Content**

#### **MODULE I:**

**Matrices:** (17 hrs) A quick review of the fundamental concepts, Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of a Non-Singular Matrix, Canonical form, Normal form. Systems of Linear equations: Homogeneous and Non Homogeneous Equations, Characteristic equation of a matrix.. (proof of all the theorems are to be excluded.)

Text 1. Chapter 4, section 4.1-4.10, chapter 6 , section 6.1,6.2,6.6, chapter 11 Section 11.1

#### **MODULE II:**

**Differential Calculus:** (20hrs) A quick review of limits of function, rules for finding limits, extensions of limit concepts, derivative of a function, differentiation rules, chain rule, rate of

change and simple applications of the rules. Extreme values of a function Rolle's Theorem, Mean Value Theorem. (Excluding proofs of theorems)

Text 2 , Sections 2.1 – 2.4, 3.1 – 3.6, 4.1 - 4.3

**MODULE III:**

Partial Differential Equations (15 hrs) Introduction, formulation of Partial Differential Equation by elimination of arbitrary constants and by elimination of arbitrary function. Solution of first order equations using Lagrange's method.

Text 3 Chapter 1, section 1 and 3 & Chapter 2 Section 1, 2 and 4

**MODULE IV:**

Laplace Transforms (20 hrs) 125 Definitions- transforms of elementary functions, properties of Laplace transforms, inverse transforms- convolution theorem (no proof).

Text 2 (Sections 6.1, 6.2 and 6.5)

**Competencies of the course:**

- Familiarize with different operations on matrices
- Understand the limits of functions.
- Understand differential equation and partial differential equation
- Familiarize with Laplace transforms

**Text book:**

- Shanti Narayan , Dr P.K Mittal , A text book of Matrices, S Chand
- George B. Thomas, Jr: Thomas' Calculus Eleventh Edition, Pearson, 2008.
- Ian Sneddon – Elements of Partial Differential Equation ( Tata Mc Graw Hill)
- Erwin Kreyszig : Advanced Engineering Mathematics, Ninth Edition, Wiley, India.

**Learning Resources :**

- S.K . Stein – Calculus and analytic Geometry , (McGraw Hill )
- Zubair Khan, Shadab Ahmad Khan - Mathematics– 1 and Mathematics – II (Ane Books)
- Shanti Narayan - Matrices (S. Chand & Company)
- N.P.Bali, Dr.N.Ch.Narayana Iyengar-Engineering mathematics – L

- Matrices, Frank Ayres JR Schaum's Outline Series, TMH Edition
- Thomas and Finney - Calculus and analytical geometry (Addison-Wesley )
- Dr. B. S. Grewal – Higher Engineering Mathematics

**BLUE PRINT**

**Code: MT2C04B18**

**COURSE TITLE: Fundamentals of Mathematics**

<b>Modules</b>	<b>Hours</b>	<b>PART A- (short answer) 2 marks 10/12</b>	<b>PART B- (short essay) 5 marks 6/9</b>	<b>PART C- (essay/problem) 15marks 2/4</b>
I	12	3	2	0
II	20	3	3	1
III	20	4	2	1
IV	20	2	2	2