

## **Programme Launching Process and Approval**

### **(Complete delivery of the course)**

#### **Bachelors in Computer Applications (BCA)**

##### **a. About the Institution's Programme:**

Bachelor in Computer Application (BCA) is an undergraduate degree course in computer applications. BCA is one of the popular courses among the students who want to make their career in the IT (Information Technology) field. It comprises of the subjects like database, networking, data structure, core programming languages like 'C' and 'java'. This course provides a lot of opportunities to the students who are interested in computer field and wants to work in the IT sector as programmer or software developer.

The core subjects of BCA are aimed at developing knowledge in various software technologies, with a view of the software industry requirements and further research. The programme involves participation in collaborative work, and practical exercises on the programming languages that are taught in the curriculum. The objective of this activity is to make the student understand the basic knowledge of possible technological details that may help them to make their career in IT industry.

With the rapid growth of IT industry in India, the demand of computer professional is increasing day by day. This increasing growth of IT industry has created a lot of opportunities for the computer graduates.

##### **b. Programme Vision and Mission**

**Vision:** To empower talent through its innovative learning experience and upgraded technological tools.

##### **Mission:**

- In order to provide a conducive teaching and learning atmosphere.
- Ensure knowledge based academic environment in the department.
- Enable the student's to solve software engineering problems independently.
- Mentoring the students with effective communications skills.
- Tutoring the students with best of social and ethical skills along with their engineering knowledge.
- Counsel the students to gear up with their urges towards self- development and continuous improvement.
- To ensure that the students are groomed in the society as a true software or IT professional.

##### **Programme/ Course Objectives:**

After going through this programme, the learners are proficient enough to do the following

- To take up positions as architect, engineer, security specialist, junior penetration tester, and network engineer in any field related to information technology.
- Imparting comprehensive knowledge with equal emphasis on theory and practical knowledge through working in industry, giving them insight into the actual workings of the IT world.

**Graduate attributes:**

BCA graduates can use the computer as a business and personal tool through the use of its applications software. Upon completion of this programme, they can:

- Benefit from the specialisation with various combinations of applications
- Learn advance programming concepts
- Use our fully equipped multi-platform suites and computer labs to enhance the learning experience
- A unique tech-enabled learning experience with Learning Management System and eLearning modules.

**University Campus:**

TeerthankerMahaveer University is a Jain Minority State Private University established by Act No. 30 of 2008 of the Government of Uttar Pradesh and has been approved by University Grants Commission (UGC) under Section 2(f) of UGC Act, 1956. The university is located on National Highway-24 and is barely 144 Kms from National Capital, New Delhi. The University stand committed to the ideals of Lord Mahaveer i.e. Right Philosophy, Right Knowledge, and Right Conduct in all its operations and aspires to be recognized as an ultimate destination for world-class education.

University is NAAC accredited and are proficient to provide counselling and tutoring to students with experience faculty members and equipped with infrastructure. With the fast pace of life and the need for up gradation of knowledge, the present generation needs are to access learning from sources which are separated by time and distance. To match the above and to keep pace with the growing global trend of extending conventional University instructional mode to online, self-learning and distance education methodology, TeerthankerMahaveer University has created the Directorate of Distance Education. This facilitates to support effective learning under the distance mode. The students are advised to make use of this high - end learning system. It is the endeavour of the University to facilitate the distant students with instructional guided content and online infrastructure with the use of advanced technology.

**c. Target Group of Learners:** Larger target learners are the working professionals who are unable to leave their job and high aspire for knowledge. Sometimes highly self-motivated students are also a part of our target audience.

**d. Job Prospects:** A candidate who holds BCA degree will have great job opportunities in top level IT companies and consultancy firms. Some of the job prospects which a BCA graduate can work for any IT company are as follows:

- Software Programmer
- Junior Engineer
- Junior Software Developer
- Junior Systems Analyst
- Junior Application Architect
- Database admin executive
- Technical analyst

## e. Instructional Design

### Curriculum structure/Programme Structure

- Duration of the programme: BCA course is of three years which comprises of 6 semesters to complete the course.
- Medium of Delivery: The instruction medium practiced in this ODL is blended mode which is a combination of high quality content and expert facilitator.
- Credit System: Credit system is a systematic way of describing an educational course by attaching credits to its components to give value to learning. Below table 1 depict the credit system description for BCA

**Table 1: Comparative Credits in Conventional and Open and Distance Learning Modes**

Semester	I	II	III	IV	V	VI	Total
Credits Conventional mode	24	24	24	24	24	24	144
Credits in Open and Distance Learning	16	16	16	16	16	16	96

It will be desirable to ensure uniformity in distribution of units between the two systems as far as possible. Thus, taking into account the number of hours indicated in Choice Based Credit System for conventional mode and the percentage of hours required for face-to-face Contact Programmes for learners in Open and Distance Learning mode, the following table 2 is provided for norms for counselling sessions in theory and practical courses with Open and Distance Learning credit value for Open and Distance Learning mode programme delivery.

**Table 2: Contact Theory and Practical Sessions**

Four courses with minimum total credit of 16 per semester			
Number of Assignments	4 Theory Papers of 4 credits If practical papers are included then there will be variation in credit and number of papers per semester		Counselling for theory only Courses: Four courses of 4 credits each
	contact sessions-practical**	Contact sessions theory*	
Four-Six subjects per semester	60 hours of guided experiments which includes self-paced learning and face to face learning.	44 hours	16 hours face to face teaching per course

- Academic calendar  
Academic Calendar for BCA starts from 1st of February (Odd Session) and 1st of August (even session) every year and ends on 31<sup>st</sup> of July and 31<sup>st</sup> of January of subsequent year respectively. Admissions will start one month prior to starting of the respective session. For more details, please refer to university notification on the website (<http://tmu.ac.in/directorate-of-distance-education/>). (Need clarity)

- Session Schedule

Session	Starting date	Closing date
Spring Session	1 <sup>st</sup> week of February	Last Week of July
Fall Session	1 <sup>st</sup> week of August	Last week of January

- Programme Matrix: Programme Matrix is applicable for Academic Year-2017-19 for Bachelors in Computer Applications (BCA).

Semester I								
Subject Code	Subject	Credits			Marks			Total Marks
		T	P	Total	IA	CA	UE	
DBCA101	Computer Fundamentals & Organization	4	-	4	30	-	70	100
DBCA102	Programming in C	4	-	4	30	-	70	100
DBCA103	Introduction to Linux	4	-	4	30	-	70	100
DBCA104	Programming in C Lab	2	-	2	30	-	70	100
DBCA105	Linux Lab	2	-	2	30	-	70	100
Semester II								
DBCA201	English	2	-	2	30	-	70	100
DBCA202	Operating System	4	-	4	30	-	70	100
DBCA203	OOPS with C++	4	-	4	30	-	70	100
DBCA204	Data Structures Using C	4	-	4	30	-	70	100
DBCA205	OOPS with C++ Lab	2	-	2	30	-	70	100
DBCA206	Data Structures Lab	2	-	2	30	-	70	100
Semester III								
DBCA301	Fundamentals of Information Security	4	-	4	30	-	70	100
DBCA302	RDBMS	2	-	2	30	-	70	100
DBCA303	COMPUTER	4	-	4	30	-	70	100

	NETWORKS							
DBCA304	PROGRAMMING in JAVA	2	-	2	30	-	70	100
DBCA305	Java Lab	2	-	2	30	-	70	100
DBCA306	RDBMS Lab	2	-	2	30	-	70	100
<b>Semester IV</b>								
DBCA401	Discrete Mathematics & Statistics	4	-	4	30	-	70	100
DBCA402	Web Technology	4	-	4	30	-	70	100
	<b>Discipline specific electives-I</b>	4	-	4	30	-	70	100
DBCA404	Web Technology Lab	2	-	2	30	-	70	100
	Discipline specific electives-I -Lab	2	-	2	30	-	70	100
<b>Elective I- Discipline specific</b>								
<b>Data warehousing and Business intelligence</b>	<b>Enterprise Application Development</b>							
DBCADW403	DBCAEAD403							
DBCADW403L	DBCAEAD403L							
<b>Semester V</b>								
	Discipline specific Elective- II	2	-	2	30	-	70	100
DBCA502	Analysis and Design of Algorithms (ADA)	4	-	4	30	-	70	100
DBCA503	Linux	4	-	4	30	-	70	100

	Administration							
DBCA504	Interactive web applications	2	-	2	30	-	70	100
DBCA505	ADA Lab using C or C++	2	-	2	30	-	70	100
	<b>Discipline specific Elective-II Lab</b>	2	-	2	30	-	70	100
<b>Elective II- Discipline specific</b>								
<b>Computer Graphics</b>	<b>.Net Technology</b>	<b>Introduction to UI/UX</b>						
DBCACG501	DBCADNET501	DBCAUIX501						
DBCACG501L	DBCADNET501L	DBCAUIX501L						
<b>Semester VI</b>								
	<b>Discipline specific Elective –III</b>	4	-	4	30	-	70	100
	<b>Discipline specific Elective –IV</b>	4	-	4	30	-	70	100
	<b>Discipline specific Elective –III Lab</b>	2	-	2	30	-	70	100
	<b>Discipline specific Elective –IV Lab</b>	2	-	2	30	-	70	100
DBCA603P	Group Project/Internship	4	-	4	30	-	70	100
<b>Elective III- Discipline specific</b>								
<b>Introduction to Cloud Technology</b>	<b>Software Testing</b>							

DBCACT601	DBCAST601
DBCACT601L	DBCAST601L
<b>Elective IV- Discipline specific</b>	
<b>OOAD and UML</b>	<b>Distributed Cross Platforms</b>
DBCAOD602	DBCADCP602
DBCAOD602L	DBCADCP602L

- Detailed curriculum

**Semester I**  
**COMPUTER FUNDAMENTALS & Organization**  
**Course Code: DBCA101**  
**Credits: 04**  
**Total Hours: 60**

**Course contents:**

**Module – 1**

**10 hours**

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 – 2**

**14 Hours**

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

**Module – 3**

**16 Hours**

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 – 4**

**08Hours**

Word processing and electronic spread sheet. An overview of MSWORD, MSEXCEL and MSPOWERPOINT.

**Module – 5****12 Hours**

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

**Books for Reference:**

1. Alexis Leon and Mathews Leon (1999): Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology “O” level made simple, BPB Pub
3. Jain V K (2000) “O” Level Personal Computer software, BPB Pub.
4. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
5. Hamacher, Computer Organization McGrawhill
6. Alexis Leon: Computers for everyone. Vikas, UBS
7. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
8. Sinha. Computer Fundamentals BPB Pub.

**PROGRAMMING IN C****Course Code: DBCA102****Credits: 04****Total Hours - 60**

**Objective: To understand logic development in programming and to learn Programming in C Language.**

**Module 1: Overview of Programming:****7 Hours**

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 2: Fundamentals of C programming:****24 Hours**

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 3: Advanced programming techniques****09 Hours**

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 4: Dynamic data structures in C****12 Hours**

Pointers- The & and \* operator, pointer expression, assignments, arithmetic, comparison, mallocvscalloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning 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 5: Additional features:**

**08 Hours**

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

**Books for Reference**

1. 2. Let us C by Yashwant Kanetkar, 6th Edition, PBP Publication
2. The C programming Language by Richie and Kenninghan, 2004, BPB Publication
3. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

**Introduction to Linux**

**Course Code: DBCA103**

**Credits: 04**

**Total Hours-60**

**Module-1**

**14 Hrs**

Linux Introduction

Introduction to Multi user System, History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr, yacc etc. getting Started (Login/Logout) . Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces.

Exploring Linux Flavors

Introduction to various Linux flavors. , Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu.History, Versions, Installation, Features, Ubuntu one. Fedora: History, Versions, Installation, Features.

**Module-2**

**12 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 – statandfstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.

**Module 3**

**10 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 4**

**12 hrs**

VI editor

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, ftp.

## **Module 5**

**12 Hrs**

### System administration

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user's accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command

### **Text Books:**

- 1.. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
- 2 .Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, and New Delhi, 2011
3. Unix Concepts and Applications, Sumitabh Das, 2010
4. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
5. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

## **C PROGRAMMING LAB**

**Course code: DBCA104**

**Credits: 02**

**Total Hours: 30**

### **List of Programs**

#### Part A

- 1 Printing the reverse of an integer.
- 2 Printing the odd and even series of N numbers.
- 3 Get a string and convert the lowercase to uppercase and vice-versa using getchar() and putchar().
- 4 Input a string and find the number of each of the vowels appear in the string.
- 5 Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
- 6 Printing the reverse of a string.

#### Part B

- 1 Searching an element in an array using pointers.
- 2 Checking whether the given matrix is an identity matrix or not.
- 3 Finding the first N terms of Fibonacci series.
- 4 Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.

- 5 Define a structure with three members and display the same.
- 6 Declare a union with three members of type integer, char, string and illustrate the use of union.
- 7 Recursive program to find the factorial of an integer.
- 8 Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
- 9 Arranging N numbers in ascending and in descending order using bubble sort.
- 10 Addition and subtraction of two matrices.
- 11 Multiplication of two matrices.
- 12 Converting a hexadecimal number into its binary equivalent.
- 13 Check whether the given string is a palindrome or not.
- 14 Demonstration of bitwise operations.
- 15 Applying binary search to a set of N numbers by using a function.
- 16 Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

### **INTRODUCTION TO LINUX/UNIX LAB**

**Credits: 02**

**Course code: DBCA105**

**Total Hours: 30**

#### List of Programs

1. Execute 25 basic commands of UNIX.
2. Basics of functionality and modes of VI Editor.
3. WAP 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. WAP to print 10 9 8 7 6 5 4 3 2 .
6. WAP that replaces all "\*.txt" file names with "\*.txt.old" in the current.
7. WAP 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. 1. Create a data file called employee in the format given below:
  - a. EmpCode    Character
  - b. EmpName    Character
  - c. Grade        Character
  - d. Years of experience    Numeric
  - e. Basic Pay    Numeric

```
$vi employee
A001     ARJUN     E1    01    12000.00
A006     Anand      E1    01    12450.00
A010     Rajesh       E2    03    14500.00
A002     Mohan        E2    02    13000.00
A005     John         E2    01    14500.00
A009     Denial SmithE2    04    17500.00
```

Perform the following functions on the file:

- a. Sort the file on EmpCode.
- b. Sort the file on
  - (i) Decreasing order of basic pay
  - (ii) Increasing order of years of experience.
- c. Display the number of employees whose details are included in the file.
- d. Display all records with 'smith' a part of employee name.
- e. Display all records with EmpName starting with 'B'.
- f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.
- g. Store in 'file 1' the names of all employees whose basic pay is between 10000 and 15000.
- h. Display records of all employees who are not in grade E2.

**Semester II**  
**ENGLISH**  
**Course Code: DBCA201**  
**Credits: 02**  
**Total hours: 30**

**Essay/Short story**

**12 Hours**

- |                    |               |
|--------------------|---------------|
| 1. Sermons in cats | Aldous Huxley |
| 2. Sporting Spirit | George Orwell |
| 3. Pepe            | Maxim Gorky   |
| 4. The Key         | A.E.W. Mason  |
| 5. The Child       | Premchand     |
| 6. Wife of a Hero  | A.J. Cronin   |

**Poetry**

**10 Hours**

- |                            |               |
|----------------------------|---------------|
| 1. God's Granduer          | G.M. Hopkins  |
| 2. Ode to a skylark        | P.B. Shelley  |
| 3. Aging                   | Maya Angelou  |
| 4. Elephant                | D.H. Lawrence |
| 5. The Journey of the Magi | T.S. Eliot    |
| 6. The Second Coming       | W.B. Yeats    |
| 7. The Unknown Citizen     | W.H. Auden    |

**Grammar**

**8 Hours**

1. Active and passive voice

2. Direct and Indirect speech
3. Framing Questions
4. Correction of Errors

**OPERATING SYSTEMS**  
**Course Code: DBCA2012**  
**Credits: 04**  
**Total hours: 60**

**Module 1 – Introduction to Operating System**

**7 Hours**

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

**Module 2 – Process Management**

**22 Hours**

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 3: Storage Management :**

**22 Hours**

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

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 4: Protection and Security :**

**9 Hours**

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.

**Books for Reference**

- 1 Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
- 2 Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
- 3 Silberschatz / Galvin / Gagne, Operating System,6thEdition,WSE (WILEY Publication)
- 4 William Stallings, Operating System, 4th Edition, Pearson Education.
- 5 H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
- 6 Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
- 7 Nutt: Operating Systems, 3/e Pearson Education 2004

**OOP's with C++**

**Course Code: DBCA203**

**Credits: 04**

**Total hours: 60**

**Module 1:**

**8 Hrs**

Introduction:

Procedure oriented versus Object Oriented Programming-characteristics 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, Looping statements- for loop, while loop, Do-while loop.

Arrays, String and Structures : fundamentals-Single dimensional, multi-dimensional arrays, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and Unions.

**Module 2:**

**16Hrs**

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, overload function-different types of arguments-different number of arguments, inline function, default argument.

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 3:**

**12 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 4:**

**12 Hrs**

Pointer:

Pointer declaration and Access, memory management-new and delete, pointer to object-referencing members using pointers, 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 5:****12 Hrs**

Console IO 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.

**Text books:**

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill.Publications.
2. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
3. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications

**References:**

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

**Data Structures using C****Course Code: DBCA204****Credits: 04****Total hours: 60****Module 1: Introduction to Data structures:****12 Hours**

Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing.

**Dynamic memory allocation and pointers:**

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:**

Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

**Module 2 : Searching :****12 Hours**

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

Sort :

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



**Module 3 Stack & Queue:****16 Hours**

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 4 : Linked List****10 Hours**

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 5: Trees****10 Hours**

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.

**Books for References :**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, AusensteinMaoshe& M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**OOPS WITH C++ LAB****Course Code: DBCA205****Credits: 02****Total hours: 30**

Write a C++ Program

1. to implement the structure.
2. to Add two time variables using constructor and destructor.

3. for function overloading.
4. for operator overloading.
5. for implementation of inheritance
6. to add two complex no using friend function.
7. for pure virtual function.
8. to create file and store the information and fetch the information.

**Data Structure using C LAB**

**Course Code: DBCA206**

**Credits: 02**

**Total hours: 30**

**Part A**

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

**Part B**

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort.

**Semester III**

**INFORMATION SECURITY FUNDAMENTALS**

**Course Code: DBCA301**

**Credits: 04**

**Total Hours: 60**

**Objectives:** To enable students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. And also to get familiarize with Asset management along with the objective to create awareness in Digital Rights management.

**Module 1: Introduction to Information Security****15 hours**

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; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

**Module 2: The Need for IT Security****15 hours**

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 3: Risk Management****15 hours**

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 4: Network Infrastructure Security and Connectivity****15 hours**

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.

**Books for References:**

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
2. Operating System Concepts, 8th Edition by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Pub: John Wiley & sons, Inc., 2009.
3. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011

**RDBMS****Course Code: DBCA302****Credits: 02****Total Hours: 30**

**Objectives:** The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

**UNIT I INTRODUCTION****10 hours**

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

#### **UNIT II RELATIONAL MODEL**

**20 hours**

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

#### **UNIT III DATABASE DESIGN**

**20 hours**

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

#### **UNIT IV TRANSACTIONS**

**10 hours**

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.

#### **TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006
2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addison Wesley, 2007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.

### **COMPUTER NETWORKS**

**Course Code: DBCA303**

**Credits: 04**

**Total Hours: 60**

**Objectives:** The focus of this unit is providing a background to the basics of networking and its underlying principles. The learners taking this unit 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 unit underpins the principles of networking and enables the learners to work towards taking up vendor certifications in the

networking domain. This course enables 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.

### **Module 1: Networking Fundamentals**

**12 Hours**

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 (Fibre 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 2: Basics of Network Devices**

**12 Hours**

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 802.11a, IEEE 802.11b, IEEE 802.11g, wireless LAN modulation techniques, wireless security Protocols: WEP, WPA, 802.1X, Installing a wireless LAN

### **Module 3: Basics of Network, Transport and Application Layers**

**12 Hours**

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 4: WAN Technology**

**12 Hours**

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 5: Network Operating Systems and Troubleshooting Network**

**12 Hours**

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

**Books for References:**

- 1 CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
- 2 CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
- 3 Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
- 4 CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

**Programming in Java**  
**Course Code: DBCA304**  
**Credits: 02**  
**Total Hours: 30**

**Objectives:**Java is strong web development tool, which the, students will learn to further understand various aspects of web application developments and enable them to develop their own sites and web applications.

**Module 1 – Introduction**

**3 Hours**

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 2 – Classes:**

**9 Hours**

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 3 – Packages:**

**4 Hours**

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 4- Multithreaded Programming:**

**7 Hours**

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. 1/0 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 5 – JAVA Database Connectivity (JDBC) :**

**08 Hours**

Database connectivity: 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.

**Books for Reference:**

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

16BCA3C2L- RDBMS LAB

45 hours

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. Joins: Equijoins, Non-Equijoins, Joining Two Tables, Self Joins, Left Outer Joins, Right Outer Joins, Full Outer Joins, Natural Joins
7. Create a Table called Student (Student\_id, Sname, DepNo, email) and insert at least ten tuples
8. Create one simple view on student database which contains all students records belong to department BCA
9. Try to insert one row data through the view and verify it in the base table
10. Perform below specified operations with the above table.
  - i. Rename the table.
  - ii. Add one column (sex) to that table which contains either M or F.
  - iii. Drop column from the table.
  - iv. Drop the table.

16BCA3C4L- JAVA PROGRAMMING LAB

45 hours

List of Programs

Part A



1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

#### Part B

12. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
13. Write a program to get file name at runtime and display number of lines and words in that file.
14. Write a program to list files in the current working directory depending upon a given pattern.
15. Create a textfield that allows only numeric value and in specified length.
16. Create a Frame with 2 labels, at runtime display x and y coordinate of mouse pointer in the labels.

### Semester IV

#### Discrete Mathematics & Statistics

Course Code: DBCA401

Credits: 04

Total Hours: 60

**Objectives:** Discrete structures is a subject to study for understanding mathematical structures in the form of discrete not in continuous. It motivates the student to apply logical reasoning to solve a particular problem and also able to construct direct and indirect proof.

**Unit : I**

**12 Hrs**

Logic -I

Proposition, logical connectives, laws of logic, logical equivalence, rules of inference.

Logic –II

Predicate and Quantifiers.negations, logical equivalence with quantifiers.

**Unit : II**

**13 Hrs**

Basics of Counting

Fundamental principles, Permutation and Combinations, Mathematical Induction, Recursive Definitions.

Relations & Functions

Sets, Relations,Functions, Pigeonhole Principle.

**Unit : III**

**12 Hrs**

Properties of Relations

Representing Relations, Hasse diagrams, Closure of Relations, Transitive closure- Warshall's Algorithm Equivalence Relations, Partial Ordering.

**Unit : IV**

**13Hrs**

Group Theory

Definition and Properties of Groups, Sub Groups, Cyclic Groups.

Group codes

Group codes, Decoding with coset leaders, Hamming Matrices.

**Unit : V**

INTRODUCTION TO STATISTICS

(10 hours)

Definition- functions of statistics with real time examples – applications of statistics to various fields- concept of discrete and continuous data – concept of primary and secondary data – classification and tabulation – different types of classification – different types of classification with examples- graphical measures – location of mode using histogram and median using cumulative frequency curves

**Text Book:**

1. Discrete and Combinatorial Mathematics, R.P. Grimaldi, Pearson Education, Fourth Edition Asia, New Delhi, 2002
2. V.K. Kapoor & S.C. Gupta – Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
3. Goon, A.M. Gupta, M.K. Das Gupta B. – Fundamental of Statistics Vol I, The World Press Pvt. Ltd.

**Reference Books:**

1. Discrete Mathematics with Applications, Thomas Koshy, Academic Press, 2005

2. Discrete Mathematics and its Applications, Kenneth H. Rosen, Sixth Edition Tata McGraw-Hill Publishing Company Limited, New Delhi, 2004
3. Elements of Discrete Mathematics, Liu, TMH, 2004.
4. Essence of Logic', John Kelley, PHI, 2002.

### **Web Technology**

**Course Code: DBCA402**

**Credits: 04**

**Total Hours: 60**

**Learning Outcome:** Internet technologies are getting upgraded as each day passes. There are many web technologies. HTML, CS, JavaScript are a few of them. This course gives an introduction to web technologies and internet. WWW, protocols, HTML, CSS and XML are covered in this course.

#### **UNIT I - Web Essentials & Mark-up Languages**

**10 hours**

Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers

Mark-up Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents

#### **UNIT II – Style Sheets & Client Side Programming**

**20 hours**

Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-Other Properties

Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators- Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

#### **UNIT III –Host Objects and Server-side programming**

**20 hours**

Host Objects: Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of window

Server-Side Programming: Java Servlets- Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies- URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency

**UNIT IV – Web Data & JSP**

**10 hours**

Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration-Namespaces JavaScript and XML: Ajax-DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers

JSP Technology Introduction-JSP and Servlets-Running JSP Applications Basic JSP-JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm

**TEXT BOOK:**

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
3. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
4. Marty Hall and Larry Brown, "Core Web Programming", Second Edition, Volume I and II, Pearson Education, 2001.

**Elective-I- 4 credits**

**Web Technology Lab**

**Course Code: DBCA403L**

**Credits: 02**

**Total Hours: 30**

**ALLSERVE Corporation is a retail showroom carrying out operations across 17 countries and with 52 offices and 300 plus showrooms.**

1. Create a web page with the following details for ALLSERVE Corporation, using HTML5.0
  - a. To embed an image map in a web page
  - b. To fix the hot spots
  - c. Show all the related information when the hot spots are clicked.
2. Create a web page with different types of Cascading style sheets (use CSS 3.0) to show case a variety of shopping products.
3. Client Side Scripts for Validating the Online Purchase Order/Web Form Controls using DHTML
4. Write programs in Java to create applets incorporating the following features:
  - a. Create a colour palette with matrix of buttons
  - b. Set background and foreground of the control text area by selecting a colour from colour palette.
  - c. In order to select Foreground or background use check box control as radio buttons
  - d. To set background images
5. Write programs in Java using Servlets:

- a. To invoke servlets from HTML forms
- b. To invoke servlets from Applets
- 6. Write programs to create three-tier applications using JSP and Databases

Conducting on-line shopping and displaying the list of items purchased by individuals in a year. Assume that sales information is available in a database which has been stored in a database server.

- 7. Programs using XML – Schema – XSLT/XSL
- 8. Programs using AJAX

### **Elective-I-Lab-2 credits**

### **Semester V**

### **Elective II- 2 credits**

## **Analysis and Design of Algorithms**

**Course Code: DBCA502**

**Credits: 04**

**Total hours: 60**

**Objective: This course will help the students to develop efficient data structures and algorithms in a systematic manner. In order to develop efficient software systems, it is essential that efficient algorithms and appropriate data structures are used.**

### **Course Contents-**

#### **Unit I (Lectures 10)**

Role of Algorithms in Computing: Introduction: What is an Algorithm? Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Role of algorithms in computing, Algorithms as a technology. Fundamentals of the Analysis of Algorithm Efficiency, Asymptotic notation and Basic Efficiency Classes, Algorithm design.

#### **Unit II (Lectures 10)**

Dynamic Programming: The method, Computing of Binomial Coefficient and Fibonacci Series, All pairs shortest path-Floyd's algorithm, Assembly line scheduling.

Brute Force Approaches: The method, Exhaustive search – Traveling salesman problem, Assignment problem,

#### **UNIT III (Lectures 08)**

Greedy Algorithms : The greedy strategy, Greedy methods & optimization, Topological sort, Bipartite cover, Minimum cost spanning trees, Huffman codes, Single source shortest paths-Dijkstra's algorithm

## UNIT IV

(Lectures 08)

Sorting, Sets and Selection: Merge sort, The Set Abstract Data Type, Quick sort, Bucket sort, Radix sort, Selection Sort and Bubble Sort, Sequential Search Comparison of sorting algorithms.

## Unit V

Text Processing and Cryptography: Strings and Pattern matching algorithms, Introduction to cryptography concepts.

Graphs: Graph abstract data type, Data structures for graphs, Graph traversals-BFS, DFS, Directed graphs, weighted graphs

### Text Books:

1. Introduction to Algorithms. Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Second Edition/ Prentice Hall of India Pvt. Ltd 2004.

### Reference Books:

1. Data Structures, Algorithms and Applications in C++, SartajSahni, Second Edition. University Press 2005.
2. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, 2nd

## Linux Administration

Course Code:DBCA503

Credits:04

Total Hours: 60

### Unit-I

12 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

### Unit-II

12 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

### Unit-III

12 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

### Unit-IV

**12 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

### Unit-V

**12 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 - Mounting and Un mounting file systems - Link and Un link.

### TEXT BOOKS:

1. Red Hat Enterprise Linux 5 Essentials By Neil Smyth eBook Frenzy, 2010
2. Linux System Administration By Tom Adelstein, Bill Lubanovic, O'Reilly Media (March 1, 2007)

### REFERENCE BOOKS:

1. Red Hat Certified Technician & Engineer By AsgharGhori, Endeavor Technologies Inc. (August 10, 2009)
2. Linux clearly explained, Volume 1 By Bryan Pfaffenberger Elsevier, Morgan Kaufmann Pub; Book & CD-ROM 1st edition (August 15, 1999)
3. The complete idiot's guide to Linux Manuel Alberto RicartQue, Alpha (December 16, 1998)
4. Linux For Dummies Richard Blum, Dee-Ann LeBlanc John Wiley and Sons, 2007

## Interactive Web Application

**Course code: DBCA504**

**Credits:02**

**Total Hours: 30**

**MODULE 1: INTRODUCTION TO SCRIPTING LANGUAGES**

**6 hours**

Introduction of Unit, Scripting Languages and WWW, Types of Scripting Languages – server-side scripting and client-side scripting, Glue Language, Characteristics of Scripting Languages, Shell Script, PHP, Perl, Python, R, Ruby, JavaScript, Smalltalk, VBScript, etc, Front-end and back-end web development, Advantages and Disadvantages of Scripting Languages, Conclusion of the Unit.

**MODULE 2: INTRODUCTION TO JAVASCRIPT** **6 hours**

Introduction of Unit, Data types, variables, operators, expressions, statements, functions, Objects, arrays, date, math, error handling, flow control, loops, Conclusion of the Unit.

**MODULE 3: BASICS TO JAVASCRIPT OBJECT MODEL** **6 hours**

Introduction of Unit, Regular expression, JavaScript object model, Standard Document Object Model - creating nodes, namespace, DOM and HTML, DOM and CSS, Event handling, Event types, Conclusion of the Unit

**MODULE 4: WINDOWS, FRAMES AND OVERLAY IN JAVASCRIPT** **6 hours**

Introduction of Unit, Window object, dialogs, Controlling windows, Form handling, form fields, form validation, UI elements, Browser management, Media management, Conclusion of the Unit.

**MODULE 5: AJAX AND JSON** **6 hours**

Introduction of Unit, Introduction to AJAX: XMLHttpRequest, AJAX request and response, Events, Database; Introduction to JSON: Syntax, Http, Files; Sessions, templates, Relational databases, Object Relational Mapping, Conclusion of the Unit.

**Analysis and Design of Algorithms Lab- 2 credits**

**Elective II-Lab- 2 credits**

**Semester VI**

**Discipline specific Elective –III – 4 Credits**

**Discipline specific Elective –IV – 4 Credits**

**Discipline specific Elective –III Lab – 2 Credits**

**Discipline specific Elective –IV Lab – 2 Credits**

**Group Project/Internship – 4 Credits**

- **Course Materials**

- To support and emphasise on student's learning, different artefacts such as Self Learning Material, PPT, Videos and Practice Quizzes are provided on Learning Management System (LMS). Students can also obtain the printed SLM from the University free of cost.
- Resources such as PPT, QB and Video are available on LMS as e-content.
- These resources are arranged on the LMS according to ARCS Model. These are ordered according to hierarchical order of media richness theory.



- Video: To grab the attention of the student on a concept by giving him ample visual cues. (Attention)
  - PPT: Aim of the PPT is to provide base knowledge or to recall the prior knowledge (Relevance)
  - PDF: SLM has a deeper content. PPT and PDF together contribute to carry forward teacher/learner from known to unknown approach. (relevance and confidence)
  - Practice Quiz: This is an assessment artefact that aims at the student testing his understanding of the concepts by his own. (confidence and satisfaction)
- **Personal contact programme (PCP)**
  - PCP will be held at the university campus as per the schedule. 12 hours of PCP will be conducted by the faculty for each course
- **Learning Management System (LMS)**
  - Student orientation Programme is done through webinar session
  - Practical sessions on LMS: Orientation on LMS is provided through face to face with hands-on experience of activities on navigating through LMS
  - Two industry expert session will be delivered through webinar for each course
  - Schedule for the lab session is provided on LMS notification
  - Practical course is always aligned with the theory paper related to the skill and the paper is of 2 credit.
- **Monitoring:**
  - BCA programme is supported in a systematic way with sufficient academic oversight and operational support to help the learners with all the basic information needed.
  - Student Engagement Team ensures sufficient feedback and response to student's reaction to course delivery and content.
  - Timely notifications and advertisements of any event conducted at the university will be provided by the student engagement coordinators
  - Committed one-on-one communication will be carried out by the Student engagement team members
- **Helpdesk: Process of helpdesk is as given below**
  - Help desk will receive student queries
  - Help desk will allocate student queries to respective learning advisors
  - Helpdesk will escalate the student queries to faculty member or program incharge if it cannot be solved through learning advisors
  - Student query will be resolved within 48 hours of its receipt
- **Evaluation Scheme**
  - Scheme of examination

Credits	Duration of University Exam. in hour(s)	Internal Assessment Marks	University Exam. Marks	Total Marks
4	2	30	70	100
2	1	30	70	100

- Internal Assessment: The student needs to submit two set of assignment for a subject which is subjected to evaluation from the university faculty. Highest of two marks/ mean of two submission is taken as the final IA marks.

**Internal Assessment Marks Distribution Table:**

Subject Code	Subject Title	Credits	Marks allotted for Assignments	Marks allotted for Seminar / GD / Case Study	Marks allotted for Practical / Project	Total IA Marks
<b>Semester I</b>						
DBCA101	Computer Fundamentals & Organization	4	30	-	-	30
DBCA102	Programming in C	4	30	-	-	30
DBCA103	Introduction to Linux	4	30	-	-	30
DBCA104	Programming in C Lab	2	30	-	-	30
DBCA105	Linux Lab	2	30	-	-	30
<b>Semester II</b>						
DBCA201	English	2	30	-	-	30
DBCA202	Operating System	4	30	-	-	30
DBCA203	OOPS with C++	4	30	-	-	30
DBCA204	Data Structures Using C	4	30	-	-	30
DBCA205	OOPS with C++ Lab	2	30	-	-	30
DBCA206	Data Structures Lab	2	30	-	-	30
<b>Semester III</b>						
DBCA301	Fundamentals of Information Security	4	30	-	-	30
DBCA302	RDBMS	2	30	-	-	30
DBCA303	COMPUTER NETWORKS	4	30	-	-	30
DBCA304	PROGRAMMING in JAVA	2	30	-	-	30
DBCA305	Java Lab	2	30	-	-	30
DBCA306	RDBMS Lab	2	30	-	-	30
<b>Semester IV</b>						
DBCA401	Discrete Mathematics & Statistics	4	30	-	-	30

DBCA402	Web Technology	4	30	-	-	30
	<b>Discipline specific electives-I</b>	4	30	-	-	30
DBCA404	Web Technology Lab	2	30	-	-	30
	Discipline specific electives-I -Lab	2	30	-	-	30
<b>Semester V</b>						
	Discipline specific Elective-II	2	30	-	-	30
DBCA502	Analysis and Design of Algorithms (ADA)	4	30	-	-	30
DBCA503	Linux Administration	4	30	-	-	30
DBCA504	Interactive web applications	2	30	-	-	30
DBCA505	ADA Lab using C or C++	2	30	-	-	30
	<b>Discipline specific Elective-II Lab</b>	2	30	-	-	30
<b>Semester VI</b>						
	<b>Discipline specific</b> Elective –III	4	30	-	-	30
	<b>Discipline specific</b> Elective –IV	4	30	-	-	30
	<b>Discipline specific</b> Elective –III Lab	2	30	-	-	30
	<b>Discipline specific</b> Elective –IV Lab	2	30	-	-	30
DBCA603P	Group	4	30	-	-	30

	Project/Internship					
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- Last date for Submission of Assignment/Project:  
The dates for the submission of the Assignments / Project Reports will be decided by the university so that the department can submit the IA/ Project marks to the Controller of Examinations by the due date as specified on the Website. Assignment is a part of continuous evaluation.
- University examination: University exam will be conducted twice a year in the interval of 6 months.
- Pattern of the university question paper: if it is online evaluation then, pattern should be strictly multiple choice questions. However, this still follows the assessment taxonomy of blooms. 30% of the knowledge and comprehension questions and 70% of the questions are of application and above level. On the basic of this Question distribution is among 2 parts in questions paper, Part A and Part B. The distribution of marks is based on complexity involved in the pattern of the question. The total time to solve 4 credit question paper is 3 hours and 2 credit paper is 1 hour 30 minutes.
- Schedule for the examination is announced by the university
- Suppose there is a clash in the subjects in case of re-sitting, then the student is only allowed to write one of the paper (suggesting the fresh paper as first priority).
- Once the student is declared as pass there is no scope of improvement by resitting for the same paper for better marks.
- You should have minimum passing marks of 40% in IA and 40% in university exam and aggregate of 50% to be declared as pass in a subject.
- Student who fails in any one of the above mentioned assessment then it is considered to be fail.

- **Grading System**

Student's performance will be evaluated both on the internal assessment and the university exam performance.

The aggregate grading system is as shown below

Grade	Marks (%)
A – Excellent	70 and above
B – Very Good	60 – 69
C – Good	50 – 59
D – Satisfactory	40 - 49
E – Failure	_____

- **Carry over system**

Due to the privilege of carry over system for every semester, self-study should start automatically for the next Semester without waiting for the examination result.

- **Assignments**

All Assignments questions will be uploaded on the Website. Candidate has to download the assignment questions and duly answer to those question and submit it to university on or before the last date of submission. All the assignment answers are evaluated by university faculty members. The assignments aims at developing continuous study habit and self-motivated assessment for the learner. All assignments should be hand written or word processed with neat presentation. Assignment should include cover page for each course which should have the following details.

- Name of the student:
- Registration Number:
- Course name:
- Programme:
- Assignment No.:
- Date of Submission:
- Project:
  - BCA will have one real time project needs to be taken during Sixth semester of the course curriculum. This project may be based on the specialisation course that you take in third semester.
  - Project orientation: each student's group is allotted with one faculty for guiding project in the specialised course.
  - Project Guidelines  
This information will provide you guidance to develop a project thesis. Project work is always marked for 4 credits since the project work reflects skill part of BCA course curriculum.
    - Project Objective: The objectives of the BCA course curriculum Project work are to
      - Apply the skills and knowledge gained during the course by analysing a specific business problem or issue, on a piece of independent work that has to be carried over an extended period.
      - Demonstrate proficiency in the design of a research project, application of appropriate research methods, collection and analysis of data, and presentation of results.
    - Learning outcomes: on the successful completion of the course completion project work
      - Demonstrate clarity of problem definition and scope; critical evaluation of a focused review in relevant literature; a carefully argued case for the research methods employed; proficiency in the analysis and interpretation of qualitative and/or quantitative data, wherever appropriate; and sensitivity of the project towards the organizational context for which recommendations are made, if necessary
      - Illustrate the results of their research in an academically acceptable format, paying particular attention to integration of the literature review, critical evaluation of data, clear presentation of research results, and clear evaluation by implementing the recommendations.
  - **Selecting a project topic and organisation domain:** Criteria's for selecting the topic and organization:
    - a) Elective subject: Project can be undertaken on specialisation course.

- b) Originality: Project work must be carried out by yourself and must be original. You can certainly take ideas from elsewhere, but ensure to evolve them in a unique way to suit your project requirements.
  - c) Company specific: The project work should be undertaken in a company or any of its departments or any business establishments. The outcome of the project work should be useful to the organization or establishment.
  - d) You must consult your internal guide or external guide in selection of topic and only after their approval the project has to be undertaken.
  - e) You can do the project in the organization where you are working / have worked / intend to work.
  - f) It is good Idea to link your project to your future plans. This will be useful for your future job prospects and it will also demonstrate your potential employers about your enthusiasm and knowledge.
  - g) Remember that you have constraints of resources like time, monetary, and infrastructure. Hence, it is necessary to complete your project with in the specified constraints.
- Format of project report
    1. The full content of the report must be hard bound together so that the pages cannot be removed or replaced.
    2. The cover of the report must contain, title, name of the candidate, the award and the year of submission.
    3. Text pages should be printed on one side of the paper, preferably with 1.5 line spacing, and page numbers at the bottom of the each page. Margins should be 2" on the left and 1" on the right.
    4. Please use separate index sheets for all chapters each chapter should start from a new page.
    5. The declaration must be duly signed by the student
    6. The project report must be about 100-150 pages.
    7. Report must contain all the necessary documents such as Certificate from the viva-voce panel, Certificate of the University study centre, Company certificate, acknowledgements etc.
    8. One copy of the project report along with CD, must submit to the university.

#### TABLE OF CONTENTS

Page No.

Executive summary

- i) Introduction
- ii) Objective
- iii) Methodology
- iv) Analysis
- v) Conclusions
- vi) Recommendations

Part I

Company Profile

- i) Brief Introduction of a company
- ii) History (very brief) of the organization.

PART II

Project overview

- i) Introduction
- ii) Objective
- iii) Methodology
- iv) Analysis
- v) conclusions
- vi) Recommendations

Part III

- i) Appendix
- ii) Bibliography
- iii) References
- iv) Glossary

Note: this is only suggestive but not exhaustive

- Project Evaluation

### PROJECT EXAMINATION MARKS STATEMENT FOR BCA (Revised)

University:

Status:

DATE OF EXAMINATION:

Course Code:

ROLL NO	Name	INTERNAL EVALUATOR						EXTERNAL EVALUATOR						GRAND TOTAL MARKS
		Synopsis	Methodology	Analysis + Findings	Project report	VIVA	Total internal evaluator's marks	Synopsis	Methodology	Analysis + Findings	Project report	VIVA	Total external evaluator's marks	
		05 marks	10 marks	25 marks	25 marks	35 marks	100 marks	05 marks	10 marks	25 marks	25 marks	35 marks	100 marks	200 Marks
		IE1	IE2	IE3	IE4	IE5	IE=IE1+IE2+IE3+IE4+IE5	EE1	EE2	EE3	EE4	EE5	EE=EE1+EE2+EE3+EE4+EE5	IE+EE

We hereby certify that the project examination has been conducted on the date as indicated above and the information given above has been verified and found correct

1. Internal Examiner Signature with Date

2. External Examiner Signature with Date

Name:

Name:

## University Stamp with signature

- Examination and Results
- The University will conduct term-end examinations. Term-end examination dates and other details shall be published well in advance by the university on its Learning Management System. Student should check exam details from LMS notifications.
- No student will be allowed to appear for the examination without admit card. Admit Cards will be issued only to those students who fulfil the prerequisites as specified by the University. For example, Admit Cards will be issued to all fresh and Re-Registered students and, resitting candidates who have filled up the Resitting Form before the last date specified by the University.) The Admit Card is valid only when produced along with the Identity Card issued by the University.
- Candidates are not allowed to bring Mobile Phones, calculators, statistical/scientific tables, lap top computers or any object/device/ gadget inside the examination Hall which would be of unfair assistance in answering the University question papers. In case of specific subjects scientific and non-programmable calculators will be allowed after due check.
- Candidate will receive answer sheet fifteen minutes prior to the commencement of the examination. Please ensure that there are no flaws in the answer booklet.
- On the front page of the answer sheet, the candidate is required to write the Name (block capitals), Roll Number (nine digits) and Test Booklet Number (five digits) legibly in the spaces provided for the purpose. On the reverse page of the answer sheet, carefully write the Roll Number and Test Booklet Number in numerals in appropriate boxes using 2B pencil and completely blacken the corresponding circles.
- Candidate exchanging their booklet with other candidates is not permissible.
- Candidates will not be permitted to enter the examination hall after ten minutes of the commencement of examination. Candidates has to sit in the examination hall at least for 1 hour after commencing examination.
- The identity and signature of the candidates will be verified during the examination at any instance of time. Candidates are required to sign the declaration on the answer sheet in the presence of invigilator.
- In the Multiple Choice Questions (MCQs), each question has only one correct answer and must be indicated by completely darkening the appropriate circle. Darkening of more than one circle will be regarded invalid/improper.
- The test booklet can be used for rough work; but, do not leave any stray marks on the answer sheet. Do not fold, bend, cut, tear or otherwise deface/mutilate the answer sheet in any manner.
- Candidates must hand over the answer sheet and the test booklet to the invigilator before leaving the examination hall.
- Candidates caught cheating or attempting to cheat will be disqualified immediately and debarred from appearing for University Examinations in accordance with the prevailing rules of the University.
- The results will be published on the website

### **f. Admission Procedure**

- Notification of admission will be released by the university on its website



- There will be sale of prospectus, applications forms receipt of applications with documents based on which details will be taken and counselling sessions for admission is conducted
- There will be one round of verification of documents that happen once application is received
- Admissions test and interviews are conducted
- Admissions results will be announced on the university website and the results are communicated personally to successful candidates

**Mode of Fee Payment:**

1. Fees can be deposited in the form of DD in favour of **Teerthankar Mahaveer University , Moradabad** and sent to the below address:

**Teerthankar Mahaveer University, Delhi Road, Moradabad(U.P.)**

2. **Online paytm Payment link:**

<https://paytm.com/education?op=Teerthankar%20Mahaveer%20University>

3. **Through Net Banking:**

Name of the Bank: Punjab National Bank, Bagadpur, Moradabad

Bank Account No.: 601000210000473

IFSC Code: PUNB0601000

- Once the fees is received along with the necessary documents, re-verification of the documents will be conducted for successful candidates. Following are the documents needed
  - Age and ID proof
  - 10<sup>th</sup> Std Marks sheet
  - PUC marks sheet
  - 2 copies of passport size photo graphs
- Rules and regulations explained by the coordinators and obtained the compliance from the candidates
- Admission letter shall be issued to the candidates once the admission is confirmed.
- ID card and registration number shall be issued to the candidates after admissions confirmation
- Induction will be undertaken once admission letter, ID card and registration is received by the candidates.

**g. Library resources:**

- Number of Text books available in the University Library: 156137
- Number of physical journals available: 381(National-181& International-200)
- Number of Online Journal Subscribed to:4587
- Number of audio-video reference available to: 1500

- Subscription to online resources (such as EBSCO, IEEE, etc): 4
  1. EBSCO
  2. Clinical Key
  3. DELNET
  4. Manupatra (Law

h. cost estimation of the programme

Particulars	Requirements	Number	Cost per Unit	Calculation	Total
<b>Program Coordinator</b>	1 Program Coordinator	36 months	Rs 60000 per month	$1*36*60000/4$	540000
<b>Faculty member</b>	2 Faculty member	36 months	Rs 50000 per month	$2*36*50000/4$	900000
<b>Print SLM</b>	30 SLM per program	60 students	Rs 350 per SLM	$30*60*350$	630000
<b>SLM delivery</b>	6 set per program	60 students	Rs 200 per set	$6*60*200$	72000
<b>LMS</b>	36 month program	60 students	Rs 50 per month	$36*60*50$	108000
<b>Contact Classes</b>	16 hours per subject	30 subjects	Rs 1500 per hour	$16*30*1500$	720000
<b>Webinar</b>	9 hours per subject	30 subjects	Rs 1500 per hour	$9*30*1500$	405000
<b>Learning Advisor</b>	1 Learning Advisor	36 months	Rs 35000 per month	$1*36*35000/4$	315000
<b>Assignment evaluation</b>	30 subjects	60 students	Rs 50 per assignment	$30*60*50$	90000
<b>Project support &amp; evaluation</b>	1 project	60 students	Rs 500 per project	$1*60*500$	30000
<b>Online Lab</b>	1 Lab	60 students	Rs 500 per student	$1*60*500$	30000

<b>Examination</b>	30 subjects	60 students	Rs 400 per subject	$30*60*400$	720000
<b>Acquisition &amp; Admission</b>		60 students	Rs16000 per student	$60*16000$	960000
<b>Total</b>					<b>5520000</b>