MAHATHMA GANDHI UNIVERSITY

KOTTAYAM

CURRICULAM

FOR

B.Sc.COMPUTER APPLICATIONS (Triple Main) PROGRAMME.

(Computer Applications,Statistics, Mathematics.)

UNDER

CHOICE BASED COURSE CREDIT SEMESTER SYSTEM (CBCSS UG)

(Effective from 2009 admission onwards)

Eng:8 Credits, Computer:60 Credits, Statistics :26 Credits, Mathematics:26 Credits.

B.Sc.Programme in Computer Applications - Triple Main -Course Structure

Sem	1	2	3	4	5	6	Credit	Credit
ENG	5Hr/4Cr	5Hr/4Cr					8	**8**
Computer	12Hr/**10**Cr	12Hr/**10**Cr	15Hr/ **12**Cr	10Hr/ **8**Cr	10Hr/ **8**Cr	10Hr / **8** *Cr, one course is choise based	56	
Stat	4Hr/3Cr	4Hr/3Cr	5Hr/4Cr	5Hr/4Cr 5Hr/4Cr	5Hr/4Cr	5Hr/4Cr	26	
Maths	4Hr/3Cr	4Hr/3Cr	5Hr/4Cr	5Hr/4Cr	5Hr/4Cr 5Hr/4Cr	5Hr/4Cr	26	**108**
Open/Computer						5Hr/4Cr	4	4
							Total	**120**

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ENGLISH

B.Sc.Programme in Computer Applications - Triple Main -Course Structure

Sem	1	2	3	4	5	6	Credit	Credit
ENG	5Hr/4Cr	5Hr/4Cr					8	**8**

Semester	Course Code	Title of the Course	Number of hours per week	Total Credits	Total hours/ semester	University Exam Duration	Weightage	
							IA	EA
1	EN01AA901	Communication Skills in English	5	4	90	3 hrs	1	3
2	EN02AA901	Critical thinking,Academic writing & Presentation	5	4	90	3 hrs	1	3

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B.Sc COMPUTER APPLICATIONS (Triple Main) PROGRAMME

(Computer Applications,Statistics, Mathematics.)

UNDER

CHOICE BASED COURSE CREDIT SEMESTER SYSTEM (CBCSS UG)

(Effective from 2009 admission onwards)

COMPUTER APPLICATIONS

B.Sc.Programme in Computer Applications - Triple Main -Course Structure-Computetr Applications

Sem	1	2	3	4	5	6	Credit	TOTAL
Computer Applications	12Hr/**10**Cr	12Hr/**10**Cr	15Hr/ **12**Cr	10Hr/ **8**Cr	10Hr/ **8**Cr	10Hr / **8** *Cr, one course is choise based	56	
Open/Computer						5Hr / 4Cr	4	**60**

SEMESTER		TITLE OF THE COURSE	NO. OF HOURS / WEEK	TOTAL CREDITS	TOTAL HRS. PER SEMESTER	UNIVERSITY EXAM DURATION	WEIGHTAGE	
							IA	EA
1	CS01BAC08	1. Programming in C	4	3	72	3	1	3
	CS01BAC07	2. Fundamentals of Digital System	4	3	72	3	1	3
	CS01BAC05	3. S/W Lab - I	4	2	72	3	1	3
2	CS02BAC09	1. Data Structures	4	3	72	3	1	3
	CS02BAC07	2. Micro Processors & Computer Organization	4	3	72	3	1	3
	CS02BAC04	3. S/W Lab – II	4	2	72	3	1	3
3	CS03BAC15	1. Data Communication and Computer Networks	4	4	72	3	1	3
	CS03BAC13	2. Object Oriented Programming In C++	4	3	72	3	1	3
	CS04BAC04	3. System Analysis and Design	4	3	72	3	1	3
	CS03BAC14	4. S/W Lab - III	3	2	54	3	1	3
4	CS04BAC06	1. Visual Basic Programming Technique	4	3	72	3	1	3
	CS04BAC05	2. Database Management Systems	4	4	72	3	1	3
	CS04BAC07	3. S/W Lab - IV	2	2	36	3	1	3

DETAILED SYLLABUS

5	CS05BAC03	1. Java Programming	4	4	72	3	1	3
			4	4	72	3	1	3
	CS05DAP01	2. Open Course (Internet, Web Designing And Cyber Laws)	2	3	54	3	1	3
	CS05BAC21	3. S/W Lab - V						
6.	CS06BA906	1. Operating System	5	4	90	3	1	3
	CS06BB902	2. Elective (Linux Operating System)	5	4	90	3	1	3
			5	4	90	3	1	3
	CS06BB902	3. Main Project						

SEMESTER I

Programming in C

Unit 1:

Problem Solving: Problem Definition, Problem Solving, Logic developments tools - Algorithm, Flowcharts, pseudo code, Modular programming, structured and object oriented – top down and bottom up approaches, features of a good computer program.

Unit 2:

C language basics: C character set, Identifiers and keywords, Data types, Enumeration type, constants, variables, declarations, qualifiers – long, short and unsigned declarations, expressions, symbolic constants, input/output functions, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators, Precedence and order of evaluation, conditional operators, bit operators, type casting, using library functions in math.h

Unit 3:

Control flow: If statement, if….else statement, nested if ..else statement, switch statements, looping – for loop , while loop, do … while statements, nested loop structure, break, continue and go to statements.

Arrays & Strings: Single dimensional arrays, multidimensional arrays, initializing array using static declaration, Searching and sorting of Arrays, Array of Characters, Character arrays and strings, String handling Functions.

Unit 4:

User Defined Functions: Function declaration, definition & scope, recursion, Arrays and functions, call by value, call by reference, Storage Classes: automatic, external (global), static & registers.

Structures: Definition of Structures, declaration, structure passing to functions, array of structures, arrays with in structures, unions, typedef statements.

Unit 5:

Pointers: Pointer Definition, pointer arithmetic, array & pointer relationship, pointer to array, pointer to structure, dynamic memory allocation, **Files**: Introduction to files, fopen(), fscanf(), fprintf(), getc(), putc(), fclose(), Simple file handling programs. Concept of command line arguments.

Book of study:

Programming in ANSI C 4E , E. BalaGuruswamy, TMH

Programming in C, Byron S Gottfried, Shaum's Outline series. TMH

References:

Computer Fundamentals By P K Sinha & Priti Sinha Fourth Edition.

B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI

Fundamentals of Digital Systems

Unit 1:

Number Systems: Base of a number system, Positional number system, Popular number systems(Decimal, Binary, Octal and Hexadecimal), Counting in binary number system, Conversion-Decimal to Binary, Binary to Decimal, Decimal to Octal, Octal to decimal and binary, Decimal to hexadecimal, Hexadecimal to decimal, Binary and octal, Concept of binary addition and subtraction, Complements in binary number systems, 1^s Complement, 2^s Complement and their applications, Number representation in memory- bi-stable devices, Signed magnitude form, Representation of real numbers, BCD numbers- concept and addition, Concept of parity bit.

Unit 2:

Boolean Algebra and Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR – Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgan's theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Don't care conditions, XOR and it's applications, parity generator and checker.

Unit3:-

Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Triggering of flip flops , Counters- Synchronous and asynchronous , BCD, Ripple counters, Half adder, Full adder(need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers(working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle).

Unit 4:-

The Memory Elements: Concept of Registers, Shift Registers, Flip flops as building blocks of memory, RAM, ROM, organization .

Book of study :

M.M.Mano-Digital Logic and Computer design

References:

1. Thomas C Bartee- Digital computer Fundamentals

2. Floyd- Digital Electronics

3. Malvino & Leach- Digital Principles and Applications

Software Lab I

[There will be two questions: the first from Exercises 3 to 5 and the second from Exercises 6 to 10. Exercises 1 and 2 will be included in the viva]

1. Familiarization of Computer System and installation: Demonstration of various units of Computer system, handling of devices, demo on hardware units, Login process, Booting Process, software installation, driver installation, printer installation etc.

2. Practicing Operating System Commands: MS-DOS internal & External commands (dir, copy, del, ren, copy con, date, time, chkdsk, mkdir, cd, rmdir, EDIT etc). MS-WINDOWS –using start menu, desk top, task bar, word pad, note pad, file management- creation, copy, delete, moving of files in directories, selecting and executing a program - Demonstration of editing, compiling and executing a C program using a C compiler.

3. **Programs using Basic Constructs**: Fundamental data types, qualifiers- long, short, unsigned, input/output functions – scanf(), printf(), Arithmetic expressions, Evaluation of integer, real and mixed mode arithmetic expressions, truncation effect, type casting, relational and logical expressions, Conditional operators, trigonometric functions- sin(), cos(), tan(), mathematical functions – abs(), sqrt(), round() defined in math.h, printing formatted outputs using width specifier.

4. Programs using control structures: if, switch, for, while, do…while, nested structures, break and continue. Sample programs should include printing of Fibonacci numbers, prime numbers, check for Armstrong numbers, summation series – exp(x), sin series etc and verification of result using built in functions, printing pyramid like pattern & other similar patterns using nested loops.

5. Programs using Arrays: Array based programs – Creation of array containing prime numbers, matrix addition, matrix multiplication, transpose of a matrix, array sorting, preparing rank lists based on marks, searching of arrays (linear) for finding price of an item. Static initialization of arrays.

6. **String manipulation programs** – reading strings using %s, gets(), getchar(), copying one string into another, counting number of characters, vowels, words etc, using string handling functions.

7. User Defined Functions: Programs using return type functions, void type functions, example program using recursive functions, array sorting program using function with call by reference, function to copy one string into another.

8. Program using structures: array of structures, program using structure containing arrays and array of structures. Rank list preparation

9. Simple program using pointers

10. Program to create a data file, reading a data file , Simple file program for file creation and file manipulation. Search for record(linear search) and displaying

SEMESTER II

Data Structures

Unit 1:

Concept of Structured data: Data structure definition, Different types and classification of data structures, Arrays – representation of array in the memory, linear array operations, Bubble sort, Selection sort, linear search, binary search, sparse matrix.

Unit 2:

Stacks and Queues: organization and operation on stacks – Conversion between infix to postfix & prefix representations- Expression Evaluation - Organization and operations on queues-circular queue-multiple stacks and queue - Applications of stacks and queues**.**

Unit 3:

Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion – examples, circular list – doubly linked lists, garbage collection.

Unit 4:

Trees: Concept of recursion, definition of - trees, binary trees, strictly binary trees, complete binary tree and Binary search tree*,* Creation of binary search tree, traversing methods - examples.

Unit 5:

File organization: File organizations- sequential, random files, linked organization, inverted files, cellular partitioning, hashing function

Book of study *:*

Data Structures Through C (A Practical Approach), G.S Baluja Danapat Rai & Co.

Fundamentals of Data Structures, Ellis Horowitz and Sartaj Sajni Galgotia

Publications

References:

Introduction to data structures in C , Ashok N. Kamthane, Person Education

Theory and Problems of Data Structures, Schaum's Outline Series, Seymour Lipschutz

Data structures using c and C++ , Tanenbaum

Software Lab II

1. Array search and sort – Bubble sort, Selection sort, linear search, binary search, sparse matrix, polynomial addition.

2. Stack implementation, Application of stacks – Conversion of infix expression to postfix, expression evaluation.

3. Queue implementation, Implementation of circular queue.

4. Linked list- implementation, concatenation etc., circular list and doubly linked list implementation, implementation of stacks and queue using linked lists.

5. Creation and traversal of binary search trees.

Microprocessors & Computer Organization

Unit 1

Functional units of a computer, Basic operational concepts, Bus structure, Addressing methods, Memory locations and addresses, Instructions and instruction sequencing, Instruction execution**.**

Unit 2:

Introduction to the concept of 8085 microprocessor: Intel 8085, Instruction cycle, Timing diagrams, Instruction set of 8085, Addressing modes, Status flags, Intel 8085 Instructions.

Unit 3:

Introduction to the concept of 8086 microprocessor: Introduction, Pin-out Diagram, Operating modes, Operation of 8086, Registers, Interrupts, Bus Cycle, Addressing modes.

Unit 4:

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Instruction Classification.

Unit 5:

Main Memory, Organization of RAM, SRAM, DRAM,, Read Only Memory-ROM,PROM,EROM,EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

Books of study :

1. B RAM -Fundaments of microprocessors and micro computers
2. M M Mano – Computer Archtecture

References:-

1. R S. Gaonkar- Micro processor Architecture, Programming and applications with 8085.

Venugopal and Ravikanth- Introduction to assembly language programming in 8086

Software Lab II

6. Array search and sort – Bubble sort, Selection sort, linear search, binary search, sparse matrix, polynomial addition.

7. Stack implementation, Application of stacks – Conversion of infix expression to postfix, expression evaluation.

8. Queue implementation, Implementation of circular queue.

9. Linked list- implementation, concatenation etc., circular list and doubly linked list implementation, implementation of stacks and queue using linked lists.

10. Creation and traversal of binary search trees.

SEMESTER III

Data Communication and Computer Networks

Unit 1

Introduction to Data Communication, Network, Protocols & Standards and Standards Organizations - Topology - Transmission mode - Network models – OSI model – layers and their functions in OSI model – TCP/IP.

Unit 2

Data and Signals-Analog and Digital Signals –Wave Length, Bit Rate, Bit Length- Transmission Impairment-Attenuation, Distortion and Noise. Bandwidth Utilization: Multiplexing –FDM,TDM,WDM and Spreading. Transmission Media –Guided Media - Unguided Media . Switching- Circuit Switching, Datagram Network, Virtual Circuit. Dial up Modem.

Unit 3

Data Link layer. Error detection and Correction Codes. Framing, Flow Control and Error Control . Protocol for Noisy and Noiseless Channel.

Multiple Access : Random Access- ALOHA, CSMA, CSMA/CD . Channelisation Methods. Wired and Wireless LAN. Wireless WAN-Cellular Telephony and Satellite Networks.

Unit 4

Connecting Devices : Hubs, Switches, Repeaters, Bridges, Routers – Gateway.

Network Layer: Host to Host delivery - Logical Addressing – Internet protocol: IPV4 and IPV6 – Address Mapping – ICMP – IGMP – Uni Casting, Multicasting and Broadcasting

Unit 5

Transport Layer: UDP – TCP- Congestion Control: Open and Closed loop, Quality of service.
Application Layer: Name Space – Domain Name System Remote logging, FTP, SMTP, Multimedia Communication., Voice over IP.
Cryptography-Symmetric Key Cryptography and Asymmetric key Cryptography.

Text:

1. Behrouz and Forouzan - Introduction to Data Communication and Networking - 4th Edition - TMH-2000

Object Oriented Programming In C++

Unit 1:

Introduction- Object Orientation- object oriented development-Object oriented Methodology-Object oriented Models-Object oriented themes-Modeling-Objects and classes concepts-Links and association concepts-Generalization and Inheritance-state modeling-interaction modeling

Unit 2:

Object Oriented language C++: Basic concept of object oriented programming -benefits of oops-Structure of C++ Program-Basic, derived and user defined data types-Symbolic constants-operators in C++ - Control Structures -Functions in C++-The main function, function prototyping-call by reference-return by reference-inline function-function overloading- friend and virtual functions,

Unit 3:

classes and objects-specifying a class - Defining member functions - Nesting of member functions - Private member functions - arrays within a class - static data members - static member functions - Arrays of objects-objects as function arguments

Unit 4:

Constructors and Destructors- Constructors- Parameterized Constructors-Multiple constructors - Copy constructor - Dynamic constructor-Destructors - Operator overloading & Type conversions.

Inheritance-Defining derived classes-Single, Multiple, Multilevel, Hierarchical and hybrid inheritance-private, public, protected inheritance-virtual base classes-Abstract classes- Constructors in derived classes-nesting of classes.

Unit 5:

Pointers-Virtual functions and polymorphism-Pointers-Pointers to objects-this pointer-pointer to derived classes-virtual functions-Pure virtual functions-C++ streams-Stream classes-Unformatted and Formatted console I/O operations- Managing output with manipulators. Manipulating strings.

Book of study :

Object Oriented Modeling and Design with UML, Second Edition By James

Rumbaugh, Michael Blaha

Object oriented Programming with C++, Fourth edition By E. Balaguruswamy

References :

Let Us C++ ,Yashwant Kanetkar, Bpb Publications

John R Hubbard, Programming with C++, Shaum's Outline series.

Objected-Oriented Programming in C++ , Rajesh K Shukla, Wiley India.2008 Edition

Venugopal, Rajkumar, Ravishankar, *Mastering C++*, Mc Graw Hill

System Analysis And Design

Unit I

Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, top management; the system development life cycle concepts; hardware and software end products.

Life cycle activities- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Unit II

Basic tool of system analysis: identification codes – definition, need for codes, code plan, code dictionary, common type of codes, forms design – basic parts of form, style and types of form, principles of form design

Tools for structure analysis and design: Types of basic charts, decision tables, decision trees, structured English, data flow diagram, data dictionary, system flow charts, flow charting symbols, information oriented flow charts, process oriented flow charts, HIPO charts.

Unit III

Study phase: Study phase activities, information service request, initial investigation, fact finding techniques, fact analysis techniques, steps in feasibility analysis, study phase report.

Unit IV

Design phase: Design phase activities, structure design, input design- input data, input media and devices, output design, design phase report.

Unit V

Development phase: Development phase activities, bottom up and top down computer program development, training- programmer, operator, user trainings ; convertion; change over plan; PERT; steps in computer program development; structured programming; development phase report.

Book of study :

Elements Of System Analysis – Marvin Gore & John Stubbe, Galgotia Book Source.

References :

System Analysis And Design – Elias M Awad , Galgotia Book Source.

Software Engineering Concepts – Richard Fairley , Tata Mc Graw Publication.

Software Lab III

[There will be two questions one from 1 to 4 and second from 5 to 8]

1. Programs based on class, objects and manipulation of objects using member functions
2. Programs based on friend functions, passing objects as arguments to function.
3. Programs based on array of objects.
4. Programs based on function overloading, Default arguments.
5. Programs based on operator overloading (binary, unary) using member functions and friend functions.
6. Programs based on constructors, different types of constructors- copy constructor, default constructor.
7. Programs based on Inheritance, different types of inheritance.
8. Programs using virtual functions and polymorphism, this pointer

Semester IV

Visual Basic Programming Techniques

Unit 1

Visual Basic–Basic Concepts: Getting Started with Visual Basic 6, Understanding Visual Basic Projects, Designing the user interface, Putting your Forms to Work with controls, Mastering Menus and Toolbars.

Unit 2

Programming in Visual Basic : Visual Basic Code Basics, Using Visual Basic Variables, Using the Visual Basic Debugging Tools, Handling Runtime Errors.

Unit 3

Objects and Classes :Creating Objects and Classes, Advanced Class Concepts, Working with objects and collections.

Unit 4

Working with other Applications & Database Access: Mastering the Visual Basic Data Control, Creating Queries in Visual Basic, Mastering Jet DAO.

Unit 5

Advanced Data Access Methods & Report generation : Using Advanced Data Access Methods – ADO, OLEDB; Using Crystal Reports, Using the Package and Deployment Wizard.

Book of study :

Peter Norton's Guide to Visual Basic 6 by Peter Norton and Michael Groh, Techmedia Publications - Chapters:

References:

1. Visual Basic 6 from the Ground Up by Gary Cornell, Tata McGraw-Hill

2. Using Visual Basic 6 by Bob Roselman, Richard Peasley and Wayne Prunchiah, PHI

Data Base Management System

Unit –I: Introduction: Characteristics of database approach, Data base users-DBA, Data base designers and end users, Advantages of using DBMS, Data Modes- Schemas and instances, DBMS architecture and data independence. DBMS language-DDL, DML,DCL Data Base system environment, DBMS Component and modules.

ER Modeling- Introduction- Entity types, Entity sets, Attributes and Keys, Relationship Types, Relationship Sets relationship instances, Constraints on relationship types, Weak entity types, sample ER diagrams.

Unit-II: Relational Data Model: Relational model concepts domains, attributes, tuples and relations, characteristics of relations. Relational Model constraints Relational Databases and relational data base schemas, entity integrity, referential integrity and foreign keys with examples.

Relational algebra and Relational calculus:

Relations Operations- SELECT, PROJECT, , UNION, INTERSECTION, The CARTESIAN PRODUCT, JOIN, EQUIJOIN, Aggregate functions. Examples of queries in Relations Algebra Tuple relations calculus, Domain relational calculus.

Relational Data base design using ER-to-Relational mapping.

Unit-III : SQL: Data definition commands- CREATE, ALTER,DROP, Adding constraints, Basic SQL queries- INSERT, SELECT,DELETE,UPDATE Ordering of rows UNION,EXCEPT,INTERSET Substring comparisons using LIKE operator, BETWEEN operator, Complex Queries-Nested queries, EXISTS and UNIQUE functions, NULL values, Renaming of attributes and joining of tables, Aggregate functions and grouping, Managing views

Unit IV: Data Normalization:- Informal Design Guide lines for relation schemas, functional dependencies, Normal forms- first, second and third normal form, Boyce- Codd normal form.

Indexing structures for files- types of single level ordered indexes.

Unit V: Transaction processing:- Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions. Concurrency Control:- Locking techniques for concurrency control.

Database Security and Authorization:- Types of security , control measures, database security and the DBA, Access protection, User accounts and database audits, Access Control based on granting and Revoking privileges.

Book of study :

Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems" Pearson Education, 5th edition

References:

1. C.J Date, An Introduction to Database systems
2. Reghu Ramakrishnan, Data base Management Systems, Mc Graw Hill international Edition.
3. Bipin Desai, " An Intriduction to Database Systems" Galgoria Publications, 1991

Software Lab IV

[There will be two questions, the first one from Group I and second from Group II]

I SQL Commands

1. **Data definition commands** - CREATE, ALTER, DROP, Adding Constraints – Primary key, foreign key, unique key, check, not null.

2. **Basic SQL queries** – INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.

3. **Complex Queries** – Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.

4. **Managing views, Simple stored procedures.**

5. **Data Control commands** - Access Control and Privilege commands.

II Visual Basic

6. **Designing User Interface using-** List Box, Combo Box, Image and Picture Box, Directory-File-Drive list boxes, Rich text box, etc

7. **Creating Menus**- Creating Menus and writing Codes, Linking Menus with SDI forms, Creating toolbox and access it for loading and working forms.

8. **Database Connectivity using Controls** - Designing user interface with forms and controls and create database connectivity by DAO and ADO Control.

9. **Database connectivity using Object models** - Creating Database connectivity by DAO Object model and Connectivity Using ADO Object model by OLEDB as well as ADODC Connectivity.

10. **Creating Reports** - Create reports using Data Report in VB and also using Crystal report.

11. **Package and deployment Wizard** - Package, Deploy and Scripting

SEMESTER V

Java Programming

Unit 1:

Object oriented programming-Encapsulation-Inheritance-Polymorphism-Genesis of Java-characteristics of java- program structure-identifiers-operators-variables-literals-data types-Arrays. Control Statements-selection statements-iterative statements-jump statements - Loops- while loop-do while loop- for loop

Unit 2:

Classes-declaration –object references-instantiation- method declaration-method calling – this operator-constructor- method overloading-constructor overloading-method overriding-inheritance-super class-dynamic method dispatch-final-static-abstract classes – String Handling.

Unit 3:

Packages - creating packages-using packages-Interfaces-Exception Handling Techniques-try-catch-throw-throws-finally -Multithreading- creation of multithreaded program-Thread class-Runnable interface- thread priorities.

Unit 4:

Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners- AWT: Frame Class-AWT Controls: Label-Button-Checkbox-List-Choice control-Text Field-Text Area- Lay out Managers.

Unit 5

Applet Fundamentals -applet tag-applet life cycle-passing parameters to applets- working with graphics – Line-Rectangle-Oval – Arc- color setting-I/O Streams: DataInputStream-DataOutputStream-BufferedReader-BufferedWriter classes

Book of study :

Java2 The Complete Reference Seventh Edition: Patrick Naughton

References:

Programming with java –.E. Balagurusamy

1. Core Java Volume 1- Fundamentals eighth edition – Cay S Horstmann & Gary Cornell
2. Java 6 Programming Black Book 2007 Edition – Dreamtech press-

Internet, Web Designing And Cyber Laws (Open Course)

Unit 1: Internet – Introduction, Basic Communication, Local Area Network, Packet Switching, Internet: A Network of Networks, ISPs and Network Connections, IP Address, Transmission Control Protocol (TCP), Domain Names.

Unit 2: Internet Services: Electronic mail, Bulletin Board Service (Network News), Browsing the World Wide Web, Automated Web Search (Search Engines), Audio and Video Communication, Faxes and Files (FTP), Remote Login.

Unit 3: Facilities for Secure Communication, Electronic Commerce and Business.

Unit 4: Web Programming - Introduction to Html, Creating Web Pages, Formatting Tags, Font, lists, table, form, marquee, frame tags, Creation of simple Web Sites.

Unit 5: Cyber Crimes –Computer Crime, Nature of Crimes, Penalty for damage to Computer, Computer system, Tampering with Computer Source Documents, Hacking, Computer Related Offences, Theft, The Language of Cyberspace.

Books of study :

1. "The Internet", Douglas E. Comer, Prentice –Hall of India, Third Edition.
2. HTML Black Book
3. "Cyber Law Crimes", Barkha and U. Rama Mohan, Asia Law House, New Edition.

References

1. "Internet Complete Reference", Harley Hahn

Other Open Courses:

Image Processing

Multimedia

Software Testing

Software Engineering

Software Lab – V

Part I

Applet Programs : Graphics- AWT controls- Event Handling

Part II (using class and read inputs from keyboard)

Java Programs: Method Overloading- Method Overriding-inheritance-abstract class – interfaces-packages-Exception Handling-Multithreading

SEMESTER VI

Operating Systems

Unit 1:

Introduction: OS Definition, Functions, OS as a resource manager, types of OS Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

Unit 2:

Process: Basic Concepts, Process Scheduling, Operations on 'Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Unit 3:

Process Coordination : Synchronization - The Critical Section problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Dead Locks : System Model, Dead Lock Characterization, Methods of Handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, Recovery from Dead Lock.

Unit 4:

Memory Management: Memory Management Strategies -Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement

Unit 5:

Storage Management :-File System :- File Concept, Access Methods, Directory Structure, protection , Implementing File Systems :-File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

Books of study :

Operating System Principles, Seventh Edition, Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley

Operating Systems- By William Stallings

Reference:

Operating Systems- By Milan Kovic (TMH)

Linux Operating System (Elective)

Unit 1:

Linux introduction and file system - Basic Features, Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell - Linux File system - Boot block, Super block, Inode table, Data blocks, Linux standard directories. Commands for files and directories – cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces.

Unit 2:

Essential Linux commands, Understanding shells, Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, scheduling of processes. Batch commands, kill, ps, who, Printing commands, find, sort, touch, file, file processing commands - wc, cut, paste etc - mathematical commands - expr, factor etc. Creating and editing files with vi editor

Unit 3:

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

Unit 4:

Shell programming - Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash

Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks

Unit 5:

Simple filter commands – pr, head, tail, cut, sort, uniq, tr - Filter using regular expression – grep, egrep, sed
Understanding various Servers —DHCP, DNS, Squid, Apache, Telnet, FTP,Samba.

Book of study :

1. "Red Hat Linux Bible" by Cristopher Negus, Wiley Dreamtech India
2. "UNIX Shell Programming" by Yeswant Kanethkar, BPB

References :

1. "Official Red Hat Linux User's guide" by Redhat, Wiley Dreamtech India

2. "UNIX for programmers and users" by Graham Glass & King Ables, Pearson Education

3. "Beginning Linux Programming" by Neil Mathew & Richard Stones, Wiley Dreamtech India

MAIN PROJECT

Software Development lab

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 shall 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.

MAHATHMA GANDHI UNIVERSITY

KOTTAYAM

CURRICULAM FOR

B.Sc COMPUTER APPLICATIONS (Triple Main) PROGRAMME

(Computer Applications,Statistics, Mathematics.)

UNDER

CHOICE BASED COURSE CREDIT SEMESTER SYSTEM (CBCSS UG)

(Effective from 2009 admission onwards)

STATISTICS

B.Sc.Programme in Computer Applications - Triple Main - Course Structure- STATISTICS

Sem	1	2	3	4	5	6	Credit	Credit
STATISTICS	4Hr/3Cr	4Hr/3Cr	5Hr/4Cr	5Hr/4Cr 5Hr/4Cr	5Hr/4Cr	5Hr/4Cr	26	

Semester	Course Code	Title of the Course	Number of hours per week	Total Credits	Total hours/ semester	University Exam Duration	Weight age	
							IA	EA
1	ST01CAA03	Basic Satistics	4	3	72	3 hrs	1	3
2	ST02CAA04	Theory of Random Variables	4	3	72	3	1	3
3	ST03CAA02	Probability Distributions	5	4	90	3	1	3
4	ST04CAA01 ST04CAA05	**1. Statistical Inference** **2. SampleSurvey**	5 5	4 4	90 90	3 3	1 1	3 3
5	ST05CAC01	Design of Experiments	5	4	90	3	1	3
6	ST06BBA01	Operations Research	5	4	90	3	1	3

Statistics-Semester 1 –- Course I

(Common with Complementary Course to Mathematics)
Basic Statistics

Hours per week – 4

Module I

Introduction to Statistics, Population and Sample, Various Statistical Organization, Collection of Data, Various methods of data collection, Census and Sampling Methods of Sampling – Simple Random Sampling (with and without replacement) – stratified sampling – systematic sampling (Method only), Types of data – quantitative, qualitative, discrete and continuous frequency and non-frequency, Classification and Tabulation, Diagrammatic representation – Bar diagram, pie diagram; pictogram and cartogram, Graphical representation – histogram; frequency polygon; frequency curve; ogives and stem and leaf chart.

Module II

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

Module III

Idea of Permutations and Combinations, Probability Concepts – Random Experiment, Sample Space, Events, Probability Measure, Approaches to Probability – Classical, Statistical and Axiomatic, Addition Theorem (upto 3 evens) Conditional Probability, Independence of events, Multiplication theorem (upto 3 events), Total Probability Law, Baye's Theorem and its applications

Module IV

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.

Core Reference

1. S.P. Gupta: Statistical Methods (Sultan Chand & Sons Delhi).
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons.

Additional References

1. Parimal Mukhopadhya: Mathematical Statistics, New Central Book Agency (p) Ltd, Calcutta
2. Murthy M.N.: Sampling theory and Methods, Statistical Publishing Society, Calcutta.
3. Agarwal: Basic Statistics

Statistics-Semester 2 –- Course 2

(Common with Complementary Course to Mathematics)

Theory of Random Variables

Hours per week – 4

Module I

Random Variables – Discrete and Continuous, Probability Distributions – Probability Mass Function; Probability Density Function and Cumulative (distribution) function and their properties, change of variables (Univariate only), Bivariate random variables – Definition – Discrete and Continuous, Joint Probability Density Functions, Marginal and Conditional Distributions, Independence of Random Variables.

Module II

Mathematical Expectations – Expectation of a Random Variable, Moments in terms of Expectations, Moment Generating Functions (m.g.f.) and its properties. Characteristic Functions and its Simple Properties, Conditional Expectation

Module III

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

Module IV

Introduction to bivariate data – Method of Least Squares – Curve Fitting – Fitting of Straight Lines, Second Degree Equation, Exponential Curve, Power Curve, Linear Correlation – Methods of Correlation – Scatter Diagram, Covariance Method, Rank Correlation (equal ranks). Partial and Multiple Correlation (concept only), Linear Regression – Regression Equations – Fitting and identification, properties, distinction between correlation and regression, multiple regression (3 variables, concept only).

Core Reference

1. John E. Freund: Mathematical Statistics, Prentice Hall of India
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons
3. S.P. Gupta: Statistical Methods, , Sultan Chand and Sons, New Delhi

Additional References

1. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
2. Mood A.M., Graybill F.A. and Boes D.C. Introduction to Theory of Statistics, McGraw Hill.
3. B.R. Bhat, Modern Probability Theory, New Age International (p) Ltd.

Statistics-Semester 3 –- Course 3

(Common with Complementary Course to Mathematics)

Probability Distributions

Hours per week – 5

Module I

Discrete Distribution – Uniform: Geometric Bernoulli; Binomial; Poisson; Fitting of Distributions (Binomial and Poisson). Properties – Mean, Variance, Additive, m.g.f.; recurrence relation for moments (binomial and Poisson) Memory lessness property of Geometric distribution.

Module II

Continuous distributions – Uniform; Exponential; Gamma; Beta (type I and II); Normal; Standard Normal – definitions, Simple Properties and applications, Fitting of Normal, Use of Standard Normal Tables for Computation of Various Probabilities, Bivariate Normal Distribution (Marginal and Conditional)

Module III

Law of large Numbers, Tchebycheff's Inequality, Weak Law of Large Numbers, Bernoulli's Law of Large Numbers, Central Limit Theorem (Lindberg-Levy form) with proof.

Module IV

Sampling Distributions – definition, Statistic, Parameter, Standard Error, Sampling Distributions of Mean and Variance, χ^2, t and F (without derivation), properties, Inter relationships.

Core Reference

1. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons

Additional References

1. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
2. Mood A.M., Graybill F.A. and Boes D.C. Introduction to Theory of Statistics, McGraw Hill.
3. Hogg, R.V. and Craig A.T. (1970). Introduction to Mathematical Statistics, Amerind Publishing Co, Pvt. Ltd.
4. Johnson, N.L, Kotz, S. and Balakrishnan N. (1994). Continuous Univariate Distribution, John Wiley, New York.
5. Johnson, N.L, Kotz, S. and Kemp, A.W. : Univariate Discrete Distributions, John Wiley, New York.

Statistics-Semester 4 –- Course 4

(Common with Complementary Course to Mathematics)

Statistical Inference

Hours per week – 5

Module I

Concepts of Estimation, Types of Estimation – Point Estimation; Interval Estimation, Properties of Estimation – Unbiasedness, Efficiency; Consistency; Sufficiency.

Module II

Methods of Estimation – MLE, Methods of Moments, Method of Minimum Variance, Cramer Rao Inequality, Interval Estimation for Mean, Variance and Proportion.

Module III

Testing of hypothesis- Statistical hypothesis, Simple and composit hypothesis Null and Alternate hypothesis, Type I and Type II errors, Critical Region, Size of the test, P value, Power, Neyman Pearson approach , Large Sample test – Z test, Chi-Square test.

Module IV

Small sample tests – t test, Chi-square test, F test, Tests of Correlation and Regression, analysis of Variance (one way classification)

Core Reference

1. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons
2. S.C Gupta : Fundamentals of Mathematical Statistics, Sultan Chand and Sons.

Additional References

1. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
2. Mood A.M., Graybill F.A. and Boes D.C. Introduction to Theory of Statistics, McGraw Hill.
3. Richard Johnson (2006): Probability and Statistics for Engineers (Miller and Freund). Prentice Hall.

Statistics-Semester 4 –- Course 5

(Common with V Semester Core Course- 7- to STATISTICS)

Core 5.7 Sample Survey Designs

Hours per week – 5

Module I

Basic concepts: Census and Sampling, Types of Sampling – Subjective, judgement, Probability, mixed, Advantages and disadvantages, Principal steps in a sample survey, sampling and Non-sampling error, organizational aspects of sample survey.

Module II

Simple random sampling: Simple random sampling with and without replacement, procedures of selecting a sample, unbiased estimates of the population mean and population total-their variances and estimates of the variances, confidence interval for population mean and total, simple random sampling for attributes, estimation of sample size based on desired accuracy for variables and attributes.

Module III

Stratified random sampling: Estimation of the population mean and population total-their variances and estimates of the variances, proportional allocation and Neyman allocation of sample sizes, cost function – optimum allocation, comparison with simple random sampling.

Module IV

Systematic Sampling: Linear and Circular Systematic Sampling, estimates of the population mean and population total, Comparison of Systematic Sampling with simple random sampling, Cluster sampling – clusters with equal sizes – estimation of population mean and total – their variances and estimates of the variances.

Books for Study

1. D. Singh and F.S. Choudhary: Theory and Analysis of sample survey Designs, Wiley Eastern Ltd.
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Applied Statistics, Sultan Chand & Co. New Dlehi.
3. Cochran W.G.: Sampling Techniques, Wiley Eastern Ltd.

References

1. Murthy M.N.: Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
2. Sukhatme and Sukhatme: Sample survey methods and its applications, Indian Society of Agricultural Statistics.

Statistics-Semester 5 –Course 6

DESIGN OF EXPERIMENT

5 hours / week **4 credits**

Module I

Principles of Experimentation, Linear Estimation, Estimability of Parametric functions, BLUE, Gauss-Markov Theorem (without proof) 20 hrs

Module II

Testing of Linear Hypothesis, ANOVA of one-way classified data, ANOVA of two-way classified data with multiple and equal number of observations per cell. 25 hrs

Module III

Layout and Analysis of the basic designs CRD, RBD and LSD. Missing Plot Techniques, Relative Efficiency of Designs. 20 hrs

Module IV

Introduction to Factorial Experiments ? Illustrations, Main Effects, Interactions and Analysis in 2n experiments in the set up of RBD.

25 hrs

Total 90 hours

Books for study

1. Design and Analysis of Experiments 2/e (1986) M.N. Das and N.C. Giri, Wiley Eastern Limited,

Chapter ? 1; Sections 1.1-1.9, Chapter ? 2; Sections 2.1-2.5Chapter ? 3; Sections 3.1-3.7

Statistics-Semester 6 –Course 7

(Common with U.G. Programme STATISTICS 6 semester Choice Based Elective-1)

Core 6.13 Operations Research

5 hours / week **4 credits**

Module I

Operations Research: Origin and Development of OR, Objectives of OR, Modeling and types of models in OR.

10 hrs

Module II

Linear Programming: Mathematical formulation of LPP, Graphical and Simplex methods of solving LPP – Duality in Linear Programming.

25 hrs

Module III

Transportation and Assignment Problems: North – West Corner Rule, Row Column and Table Minima Method – Vogel's Approximation Method. Assignment Problem, Hungarian Algorithm of Solution.

20 hrs

Module IV

Network Analysis: Drawing the Network Diagram – Analysis of Network, Calculation of Critical Path – PERT, Expected Completion Time and its Variance.

17 hrs

Total 72 hrs

Books for study

1. Kanti Swarup, Gupta P.K., Manmohan: Operations Research, Sultan Chand and Sons, New Delhi.
2. Gupta R.K.: Operations Research, Krishna Prakashan Mandir, Meerut.
3. Schaum's Outline Series: Operation Research.

References

1. Hadley G.: Linear Programming, Addison – Wesley.
2. Gupta and Manmohan: Linear Programming, Sultan Chand & Sons, New Delhi.
3. Taha: Operations Research, Macmillian.
4. Goel & Mittal: Operations Research, Pragati Prakashan, Meerut.
5. V.K. Kapoor: Operations Research, Sultan Chand & Sons, New Delhi.

MAHATHMA GANDHI UNIVERSITY KOTTAYAM

CURRICULAM FOR

B.Sc COMPUTER APPLICATIONS (Triple Main) PROGRAMME

(Computer Applications,Statistics Mathematics.)

CHOICE BASED COURSE CREDIT SEMESTER SYSTEM (CBCSS UG)

(Effective from 2009 admission onwards)

MATHEMATICS

B.Sc.Programme in Computer Applications - Triple Main -Course Structure- Mathematics

Sem	1	2	3	4	5	6	Credit	Credit
Mathematics	4Hr/3Cr	4Hr/3Cr	5Hr/4Cr	5Hr/4Cr	5Hr/4Cr 5Hr/4Cr	5Hr/4Cr	26	**28**

Details Mathematics

Semester	Course Code	Title of the Course	Number of hours per week	Total Credits	Total hours/ semester	University	Weightage	
							IA	EA
1	MY01BAA01	MM1B01-**Foundation of Mathematics**	4	3	72	3h	1	3
2	MT02BAA01	MM2B01 –**Analytic Geometry ,Trigonometry**	4	3	72	3	1	3
3	MT03CR001	MM3B01 – **Calculus**	5	4	90	3	1	3
4	MT04BAA01	MM4B01– **Vector Calculus, Theory of Equations and Numerical**	5	4	90	3	1	3
5	MT05BAA01	MM5B01 – **Mathematical Analysis**	5	4	90	3	1	3
	MT05BAA02	**MM5B02: DIFFERENTIAL**	5	4	90	3	1	3
6	MT06BAA01	MM6B01 – **Real Analysis**	5	4	90	3	1	3

B.Sc COMPUTER APPLICATIONS DEGREE PROGRAMME
MATHEMATICS (Common with Mathematics CORE COURSE 1)
FIRST SEMESTER
MM1B01: FOUNDATION OF MATHEMATICS

4 hours/week **3 credits**

Aims

The course aims:

- to explain the fundamental ideas of sets and functions;
- to introduce basic logic;
- to introduce basic Number Theory;

Brief Description of the Course

This course introduces the concepts of sets and functions, mathematical logic, and methods of proof. A brief introduction of theory of Numbers is also included. These topics are foundations of most areas of modern mathematics, and are applied frequently in the succeeding semesters.

Learning Outcomes

On completion of this course, successful students will be able to:

- prove statements about sets and functions;
- analyze statements using truth tables;
- Construct simple proofs.
- Familiarize mathematical Symbols and standard methods of proofs.

Syllabus

Text Books:

1. K.H. Rosen: Discrete Mathematics and its Applications (Sixth edition), Tata McGraw Hill Publishing Company, New Delhi.
2. S. Bernard and J.M Child: Higher Algebra, AITBS Publishers, India,2009

Module 1 **(15 hours)**

Set theory: Sets, set operations, functions, sequences and summations

(Text - 1 Chapter - 2)

Module 2 **(20 hrs)**

Relations: Relations and their properties, n-ary relations and their applications, representing relations, equivalence relations, partial orderings.

(Text – 1 Chapter 7 excluding Section 7.4)

Module 3 **(20 hrs)**

Basic Logic

Pre-requisite: Nil.

Syllabus: Propositional logic, Propositional equivalences, Predicates and quantifiers nested quantifiers, Rules of inference, Introduction to proofs, Proof methods and strategy.

(Text book 1, Chapter - 1).

Module 4 Theory of Numbers **(17 hrs)**

Syllabus: Divisibility theory in the integers, the greatest common divisor, the Euclidean algorithm (division algorithm), Primes. The fundamental theorem of arithmetic. The theory of congruence. Basic properties of congruence. Fermat's little theorem Wilson's theorem. Euler's phi-function. Euler's generalization of Fermat's theorem.

(Text – 2 , Chapter – 1 and 26)

References :

1, Lipschutz: Set Theory and related topics (Second Edition), Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi. (Reprint 2009).

2. P.R. Halmos : Naive Set Theory, Springer. .

3. George E. Andrews : Number Theory, HPC.

4. Ian Chiswell & Wifrid Hodges: Mathematical Logic, Oxford university press

5. Graham Everest, Thomas Ward: An Introduction to Number Theory, , Springer

6. Fernando Rodriguez Villegas: Experimental Number Theory, Oxford University Press

7. Richard Johnsonbaugh – Discrete Mathematics (Pearsons)

8. C.Y Hsiung Elementary Theory of Numbers, Allied Publishers

9. Thomas Koshy - Elementary Number Theory with Applications, Academic Press

Seminar Topics:

1. History of Mathematics in Kerala and in India
2. Logical Paradoxes
3. Axiomatic Set Theory
4. Multivalued Logic

B.Sc COMPUTER APPLICATIONS DEGREE PROGRAMME
MATHEMATICS (Common with Mathematics CORE COURSE 2)
SECOND SEMESTER
MM2B01: ANALYTIC GEOMETRY, TRIGONOMETRY AND MATRICES

4 hours/week **3 credits**

Aims

The course aims:

- to explain more ideas of conics;
- to introduce Circular and hyperbolic functions of a complex variable:
- to explain rank of a matrices , Characteristic roots and characteristic vectors.

Brief Description of the Course

This course introduces tangents, normal, pole, polar ,chords of conics and also their polar equations. This course introduces the concept of circular and hyperbolic functions of a complex variable and their properties.

Explain the rank of a matrices and its Canonical form, Normal form. Express Systems of Linear equations in matrix form and to find the solution of the systems. Characteristic roots and characteristic vectors are also introduced.

Learning Outcomes

On completion of this course, successful students will be able to:

- find the equation to tangent, normal at a point on a conic ;
- find the polar equation of a line, circle , tangent and normal to conics
- familiarize real and imaginary parts of a circular and hyperbolic functions of a complex variable
- solve a System of Linear equations using the inverse of a matrix
- familiarize characteristic roots and characteristic vectors.
- To find the inverse of a matrix by Cayley-Hamilton theorem

Syllabus

Text books:

1. Manicavachagom Pillay , Natarajan – Analytic Geometry (Part I, Two Dimensions)
2. S.L. Loney – Plane Trigonometry Part – II, S. Chand and Company Ltd.
3. Frank Ayres Jr - Matrices , Schaum's Outline Series, TMH Edition.

MODULE I **(25hrs)**

Tangents and Normals (parametric form only) of a conic, Orthoptic locus. Pole and Polar. Chord in terms of given points. Conjugate diameters of ellipse and hyperbola. Asymptotes of a hyperbola, conjugate hyperbola and rectangular hyperbola.

(Relevant sections of Text 1)

MODULE II **(10 hrs)**

Polar co-ordinates, polar equation of a line, polar equation of a circle and polar equation of a conic. Polar equations of tangent and normal to these curves.

(Relevant sections of Text 1)

MODULE III

Trigonometry **(17 hrs)**

Circular and hyperbolic functions of a complex variable. Separation into real and imaginary parts. Factorisation of x^n-1, x^n+1, $x^{2n} - 2x^n a^n \cos n^{-} + a^{2n}$. Summation of infinite series by C + i S method

(Relevant sections of Text 2, Chapter – V , VII , IX)

MODULE IV

Matrices **(20 hrs)**

Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of an elementary Transformations, Equivalent matrices, Row Canonical form, Normal form, Elementary matrices only.

Systems of Linear equations: System of non homogeneous, solution using matrices, Cramer's rule, system of homogeneous equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors. Cayley-Hamilton theorem (statement only) and simple applications

(Text 3, Chapters – 5, 10, 19, 23).

Reference Books:

1. S.K . Stein – Calculus and analytic Geometry , (McGraw Hill)
2. A. N. Das – Analytic Geometry of Two and Three Dimension (New Central Books)
3. Thomas and Finney - Calculus and analytical geometry (Addison-Wesley)
4. Shanti Narayan - Matrices (S. Chand & Company)

B.Sc COMPUTER APPLICATIONS DEGREE PROGRAMME

MATHEMATICS (Common with Mathematics CORE COURSE 3)

THIRD SEMESTER

MM3B01: CALCULUS

5 hours/week **4 credits**

Brief Description of the Course

This course introduces higher order derivatives, Leibnitz theorem, for higher derivatives of the product of two functions. Series expansions of functions using Maclaurin's theorem and Taylor's theorem are discussed. Some applications of derivatives in finding maxima, minima, point of inflection, curvature etc are introduced. The concept of partial derivatives and its properties are also introduced.

In integral calculus, certain reduction formulae are discussed. Application of integrals in finding plane area, surface area, arc length, and volume of solids of Revolution are introduced and double and triple integrals and some applications are also introduced.

Objectives

After completing this course the learner should be able to

- Find the higher order derivative of the product of two functions.
- Expand a function using Taylor's and Maclaurin's series.
- Conceive the concept of asymptotes and obtain their equations.
- Learn about partial derivatives and its applications.
- Find the area under a given curve, length of an arc of a curve when the equations are given in parametric and polar form.
- Find the area and volume by applying the techniques of double and triple integrals

Syllabus

Text Books:

1. George B. Thomas Jr. (Eleventh Edition) – Thomas' Calculus, Pearson, 2008.
2. Shanti Narayan and P. K. Mittal– Differential Calculus (S. Chand & Co.) 2008.

Module I

Differential Calculus (30 hrs.)

Successive Differentiation . Expansion of functions using Maclaurin's theorem and Taylor's theorem. Concavity and points of inflexion. Curvature and Evolutes. Length of arc as a function derivatives of arc, radius of curvature – Cartesian equations. Centre of curvature, Evolutes and Involutes, properties of evolutes. Asymptotes and Envelopes.

(Text 2 Chapter - 5, Chapter – 6, Chapter 13, Chapter – 14 , Chapter - 15 section 15.1 to 15.4, Chapter – 18 section 18.1 to 18.8)

Module II

Partial Differentiation (20 hrs.)

Partial derivatives, The chain rule., Extreme values and saddle points, Lagrange multipliers, Partial derivatives with constrained variables.

(Text 1 Section 14.3 , 14.4, 14.7, 14.8, 14.9)

Module III

Integral Calculus (20 hrs.)

Substitution and area between curves, volumes by Slicing and rotation about an axis. Volumes by cylindrical shells, Lengths of Plane Curves, Areas of surfaces of Revolution and the theorems of Pappus..

(Text 1 Section 5.6, 6.1, 6.2, 6.3, 6.5)

Module IV

Multiple Integrals. (20 hrs.)

Double integrals, Areas, Double integrals in polar form, Triple integrals in rectangular coordinates, Triple integrals in cylindrical and spherical coordinates, substitutions in multiple integrals.

(Text 1 Section 15.1, 15.2 (area only) 15.3 , 15.4, 15.6 ,15.7)

Reference:

1. T. M. Apostol – Calculus Volume I & II (Wiley India)
2. Widder – Advanced Calculus ,2nd edition
3. K. C. Maity & R. K. Ghosh – Differential Calculus (New Central Books Agency)
4. K. C. Maity & R. K. Ghosh – Integral Calculus (New Central Books Agency)
5. Shanti Narayan, P.K. Mittal - Integral Calculus – (S. Chand & Co.)
6. Anton: Calculus, Wiley.

B.Sc COMPUTER APPLICATIONS DEGREE PROGRAMME
MATHEMATICS (Common with Mathematics CORE COURSE 4)
FOURTH SEMESTER

MM4B01 : Vector Calculus, Theory of Equations and Numerical Methods

5 hours/week **4 credits**

Text Books:

1. George B. Thomas Jr. (Eleventh Edition) – Thomas' Calculus, Pearson, 2008.
2. Bernard and Child - Higher Algebra, AITBS Publishers, India
3. S.S. Sastry - Introductory Methods of Numerical Analysis, Fourth Edition, PHI.

Module I

(A quick review) **(20 hrs)**

Lines and planes in space., Cylinders and Quadric surfaces, Vector functions Arc length and Unit tangent vector, Curvature and Unit normal vector, torsion and Unit Binormal vector, Directional derivatives and gradient vectors , tangent planes and Differentials

(Sections 12.5 ,12.6 , 13.1 , 13.3 , 13.4 , 13.5 , 14.5 , 14.6 of Text 1)

Module II

Integration in Vector Fields **(30 hours)**

Line integrals, Vector fields, work circulation and flux, Path independence, potential functions and conservative fields, Green's theorem in the plane, Surface area and surface integrals, Parameterized surfaces, Stokes' theorem (statement only), Divergence theorem and unified theory (no proof).(Sections 16.1 to 16.8 of Text 1)

Module III

Theory of Equations **(25 hours)**

Statement of fundamental Theorem of algebra. Deduction that every polynomial of degree n has n and only n roots. Relation between roots and coefficients. Transformation of equations. Reciprocal equations. Cardan's method, Ferrari's method. Symmetric functions of roots.

(Chapter 6 and Descartes Rule of signs also, 11 , 12 of Text 2)

Module IV

Introductory Methods of Numerical Solutions **(15 hours)**

Bisection Method, Method of False position, Iteration Method, Newton - Raphson Method

(Sections 2.2, 2.3, 2.4, & 2.5 of Text 3)

References

1. Erwin Kreyszig : Advanced Engineering Mathematics, 8th ed., Wiley.
2. H.F. Davis and A.D. Snider: Introduction to Vector Analysis, 6th ed., Universal Book Stall, New Delhi.
3. Shanti Narayan, P.K Mittal – Vector Calculus (S. Chand)
4. Merle C. Potter, J. L. Goldberg, E. F. Aboufadel – Advanced Engineering Mathematics
5. Ghosh, Maity – Vector Analysis (New Central books)
6. Quazi Shoeb Ahamad - Numerical and Statistical Techniques (Ane Books)

Seminar topics

Modeling projectile motion, planetary motion and Satellite, Area, moments and Centre of mass, Masses and Moments in three dimensions, Convergence of Iterations, Speed of Convergence, Algorithms of Iterations.

B.Sc COMPUTER APPLICATIONS DEGREE PROGRAMME
MATHEMATICS (Common with Mathematics CORE COURSE 5)
FIFTH SEMESTER
MM5B01: MATHEMATICAL ANALYSIS

5 hours/week **4 credits**

Text Books:

1. S.C.Malik, Savitha Arora _ Mathematical analysis. RevisedSecond edition.
2. J.W. Brown and Ruel.V.Churchill _ Complex variables and applications, 8th edition. Mc.Graw Hill.

Module I **15 hours**

Intervals. Bounded and unbounded sets, supremum, intimum. Order completeness in R. Archimedian property of real numbers. DEdekinds form of completeness property.
(Sections 2.6, 3, 4.1 ,4.2, 4.3, 4.4 of text 1)

Module II **25 hours**

Neighbourhood of a point. Interior point of a set. Open set. Limit point of a set. Bolzano weierstrass theorem for sets. Closed sets, closure of a set. Dense sets. Countable and uncountable sets.(Sections : 1.1,1.2,1.3,2,2.1,2.2,3.1,3.2,3.3,3.4,3.5,4 of chapter 2 of text 1)

Module III **30 hours**

Real sequences. The range, bounds of a sequence. Convergence of sequences. Some theorems, limit points of a sequence. Bolzano weierstrass theorem for sequences. Limit interior and superior. Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences. Some important theorems and examples related to them. Monotonic sequences, subsequences.
(Sections : 1.1,to 1.5, 2.to2,3. 4 to5 ,6 ,6.1 ,7,8 9, 9.1 of chapter 3 of text 1)

Module IV

complex numbers **20 hours**

Sums and products. Basic algebraic properties. Further properties. Vectors and moduli. Different representations. Exponential forms. Arguments of products and quotients. Product and powers in exponential form. Foots of complex numbers. Regions in the complex plane.
(Section 1 to 11 of chapter 1 of text 2.)

References:

1. Robert G Bartle and Donald R Sherbert –Introduction to real analysis 3rd edition.Wiley
2. Richard R Goldberg – Methods of real analysis 3rd edition , Oxford and IBM Publishing Co (1964)
3. Shanti Narayan – A Course of mathematical analysis , S Chand and Co Ltd(2004)
4. Elias Zako – Mathematical analysis Vol1, Overseas Press, New Delhi(2006)
5. J. M .Howie – Real Analysis, Springer 2007
6. K.A Ross - Elementary Real Analysis, Springer, Indian Reprint
7. M.R Spiegel – Complex Variables, Schaum's Series

Seminar topics:

Expansion of sin $n\theta$, cos $n\theta$, $\sin^n \theta$

BSc COMPUTER APPLICATIONS DEGREE PROGRAMME
MATHEMATICS (Common with Mathematics CORE COURSE 6)
FIFTH SEMESTER
MM5B02: DIFFERENTIAL EQUATIONS

5 hours/week **4 credits**

Text Books:

1. Shepley L. Ross - Differential Equations, 3rd ed., (Wiley India).
2. Ian Sneddon – Elements of Partial Differential Equation (Tata Mc Graw Hill)

Module I :Ordinary differential equations

Exact differential equations and integrating factors (proof of theorem 2.1 excluded) , separable equations and equations reducible to this form,, linear equations and Bernoulli equations, special integrating factors and transformations. Orthogonal and oblique trajectories.
(Sections 2.1 , 2.2, 2.3 , 2.4, 3.1 of Text 1)

Module II Basic theory of linear differential equations. The homogeneous linear equation with constant coefficients. The method of undetermined coefficients, Variation of parameters, The Cauchy – Euler equation.(Section 4.1 , 4.2 , 4.3, 4.4, 4.5 of Text 1)

Module III Power series solution about an ordinary point, solutions about singular points, the method of Frobenius , Bessel's equation and Bessel Functions, Differential operators and an operator method.(Section 6.1 , 6.2 , 6.3, 7.1 of Text 1)

Method IV : Partial Differential equations Surfaces and Curves in three dimensions, solution of equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$. Origin of first order and second order partial differential equations, Linear equations of the first order, Lagrange's method (Chapter 1 , section 1 and 3 & Chapter 2 Section 1, 2 and 4 of text 2)

Reference: Reference:

1. A.H.Siddiqi & P. Manchanda – A First Course in Differential Equation with Applications (Macmillian)
2. George. F. Simmons – Differential equation with applications and historical notes (Tata Mc Graw Hill)
3. W.E. Boyce & R.C. Diprima - Elementary Differential Equations and boundary value Problems, (Wiley India)
4. S. Balachandra Rao & H. Ranuradha – Differential Equation with Applications and Programs (Universities Press)
5. R. K. Ghosh & K. C. Maity - An Introduction to Differential Equations (New Central Books Agency)
6. B. K. Dutta – Introduction to Partial Differential Equations (New Central Books) .

   Murrary –.Differential Equations. Macmillian
7. E.A. Coddington - An Introduction to Ordinary Differential Equation, PHI.
8. Sankara Rao - Introduction to Partial Differential Equation,2nd edition, PHI.
9. Zafar Ahsan - Differential Equations and their Applications , 2nd edition, PHI

B.Sc COMPUTER APPLICATIONS DEGREE PROGRAMME
MATHEMATICS (Common with Mathematics CORE COURSE 9)
SIXTH SEMESTER
MM6B01: REAL ANALYSIS

5 hours/week **4 credits**

Text book: S.C.Malik and Savitha Arora - mathematical Analysis, 2nd Edition.

Module I :

Infinite Series **20 hours**

A necessary condition for convergence. Cauchy`s general principle of convergence for a series. Positive term series. A necessary condition for convergence of positive term series. Geometric series. The comparison series $\sum\frac{1}{n^p}$ comparison test for positive term series without proof. Cauchy`s root test DALEMBERTÈS RATIO test. Raabe's test. Gauss`s test. Series with arbitrary terms. Alternating series. Absolute convergence

(Section 1.1 to 1.4,2 ,2.1 to 2.3,3,4,5,6,9,10,10.1,10.2 of chapter 4 of Text 1)

Module II :

Continuous functions **25 hours**

Continuous function (a quick review). Continuity at a point, continuity in an interval. Discontinuous functions. Theorems on continuity. Functions continuous on closed intervals. Uniform continuity.(Section 2.1 to 2.4 ,3,4 of chapter 5 of Text 1)

Module III :

Riemann Integration **30 hours**

Definitions and existence of the integral. Inequalities of integrals. Refinement of partitions of integrability. Integrability of the sum of integrable functions. The integrals as the limit of a sum. Some applications. Some integrable functions. Integration and differentiation. The fundamental theorem of calculus.(Section 1 to 9 of chapter 9 of Text 1)

Module IV :

Uniform Convergence **15 hours**

Point wise convergence. Uniform convergence on an interval. Cauchy`s criterion for uniform convergence. A test for uniform convergence of sequences. Test for uniform convergence of series. Weierstrass`s M-test, Abel`s test. Statement of Dirichelet`s test without proof.

(Section 1 to 3.2 of Text 1

References:

3. Robert G Bartle and Donald R Sherbert–Introduction to real analysis 3rd edition.
4. Shanti Narayan and P.k Mital – A Course of mathematical analysis , S Chand and Co Ltd(2004)
5. J. V Deshpande – Mathematical analysis and Applications
6. Chatterjee - Real analysis , PHI
7. Royden - Real analysis ,3rd edition, PHI
8. R. A. Gordon - Real Analysis 2nd Edn. (Pearson)
9. Nanda, Saxena – Real Analysis (Allied)