

MAHATMA GANDHI UNIVERSITY KOTTAYAM

BACHELOR OF DEGREE PROGRAMME IN COMPUTER SCIENCE

SCHEME & SYLLABUS (Effective from 2009 Admissions onwards)

BACHELOR OF COMPUTER SCIENCE

1. About the Course

Technology is defined as the applications of Basic Science. The past two revolutions, industrial and electronic, have transformed the society from agricultural to industrial and then to electronic. The electronically based technologies focused in information gathering, processing and distribution. The use of this technology in all sectors gave the birth to Computer Industry and its unprecedented growth launched another revolution in Communication.

Information, the basic raw material for the Decision Support System, can be derived from processing of huge database related with different sectors. Systematic storage and management with adequate security are essential for data retrieval and processing to generate information. The information technology plays an important role in all areas. But the main drawback is the technophobia of the people to adapt with the new technologies. This may be due to lack of awareness of the merits and advantages of new technologies. So our youths have to be equipped with all kinds of knowledge tools to work with computers comfortably which are basic requirements to provide human resource to the industry.◆

The radical changes in technologies, both hardware as well as software, and their ever increasing adaptation to newer areas of application, demand frequent updation of the academic curriculum so that the students can rise to the expectation of the Industry. The syllabus revision committee has considered all these factors thoroughly before venturing into the revision exercise.

The revised syllabus for B Sc Computer Science Programme provides a strong foundation to pursue post graduation programme in computer science / applications. The knowledge acquired by the students may also equip them to meet the industrial need, and get placed.◆

7.4..2. Attendance:.

%age of Attendance	Grade
>90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
< 75	E

7.4.3 Assignments: Best ♦ two assignments are considered per course

7.4.4. Seminar/Viva : The student has to take a minimum of 1 seminar per course.

7.4.5. Class test. ♦ A minimum of 2 class tests are to be attended. ♦ The grades of best 2 test are to be taken ♦

7.4.6. The evaluation of all components are to be published and are to be acknowledged by the ♦♦♦♦ candidate. ♦ All documents of internal assessments are to be kept in the college for 2 years and shall be made available for verification by the university. ♦ The responsibility of evaluating the internal assessment is vested on the teacher(s) who teach the course.

♦♦♦♦♦♦ In case a candidate fails to secure the minimum grade D in internal assessment, he/she may secure it by repeating the course altogether in a regular class or to take the course with a faculty member assigned by the Head of the Department. But such improvement in internal in the same paper cannot be attempted more than once.

♦ The supplementary examinations will be conducted along with the next regular semester examinations.

8. PATTERN OF QUESTIONS

♦♦♦♦♦♦♦♦ ♦ Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. ♦ The question setter shall ensure that questions covering all skills are set. ♦ He/She shall also submit a detailed scheme of evaluation along with the question paper.

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

♦♦♦♦♦♦♦♦ ♦ Weight: Different types of questions shall be given different weights to quantify their range as follows:

♦♦♦♦♦♦♦♦♦♦	Type of questions	Weight	Number of questions to be answered
1	A bunch of 4 objective type questions	1	4 bunches (no choice)
2	Short answer type questions	1	5 out of 8
3	Short essay/problem solving ♦ type questions	2	4 out of 6
4	Essay type questions	4	2 out of 3

9. Requirement for the completion of Programme

♦ A candidate has to complete the Programme within a period of five years after the registration.

c) A candidate who does not complete the concerned semester with the minimum attendance requirement prescribed will not be permitted to attend the next semester.

PROPOSED SCHEME FOR B Sc Computer Science PROGRAMME REVISED CURRICULUM - 2009

I Semester

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab.		
BCS101	English-I (Common)	5	-	3	4
BCS102	Mathematics I (Complementary)	4	-	3	4
BCS103	Basic Electronics and Computer Fundamentals (Core)	4	-	3	4
BCS104	Methodology of Programming and Programming in C (Core)	4	-	3	3
BCS105	Digital Electronics (Complementary)	4	-	3	4

Overloading, operator overloading, overloading unary operators, overloading binary operators, function overloading, data conversion

Module 3(10 hrs)

Inheritance, Base class and derived class , forms of inheritance, public inheritance, private inheritance, constructors in derived class.

Module 4(14 hrs)

Virtual functions, pointers, memory management, new and delete, pointers within a class, pointers to objects, array of pointers to objects, pointer to object members, pointer to derived class objects, pointers to pointers, polymorphism, virtual function, pure virtual function, abstract classes , late binding, early binding, the this pointer

Module 5(14 hrs)

Files and streams, streams, predefined console streams, string I/O, object I/O, files, file modes, file pointers, file input/output command line arguments, templates, exception handling.

Book of study

E.Balaguruswamy, *Object Oriented Programming in C++*

References

1. Schaums Outline series, *Programming in C++*
2. Venugopal, Rajkumar, Ravishankar, *Mastering C++*, Mc Graw Hill
3. Stroustrup, Bjarne, *The C++ Programming Language* , Addison Wesley
4. Robert Lafore, *Object Oriented Programming in C++*, McGraw Hill

BCS206: SoftwareLab II (C++)(Core)

Simple Programs using OOP concepts 8 hrs.

Inline and friend functions 6 hrs

Constructors and destructors 6 hrs

Array of objects 6 hrs

Over loading 6 hrs

Inheritance 6 hrs

Pointers and memory management 8 hrs

Virtual functions 6 hrs

Files Command line arguments 6 hrs

Templates and Exception handling 6 hrs

64 hrs

Total

SEMESTER 3

BCS301 : Probability and statistics (Complementary).
(Syllabus as approved by Board of Studies of Statistics (UG)

BCS302 : SYSTEM SOFTWARE (Core)

Module 1 (8 Hrs)

System software- General concepts, Assemblers- Design of assembler, Macros and Macroprocessor, Macro definitions& Instructions, Features of macro facility, Nested macros calls.

Module 2 (8 Hrs)

Loading, Linking & Relocating- Loading& Linking Schemes- Relocatability of Programs, Concepts of Binders, Linking Loaders, Overlays, Dynamic Binders, Design of an absolute loader.

Module 3 (16 Hrs)

Phase of compiler, Aspects of Compilation- Data types, Data Structure, Scope rules, Control structure, Compilation Process- Analysis phase, Synthesis phase, Programming language grammars Derivations, Reduction and system trees.

Module 4 (16 Hrs)

Classification of grammars, Ambiguity in program specification, Lexical Scanner, Parsing-Top down, Bottom up, Table driven parsing.

Module 5 (16 hrs)

Compilation of expressions, Intermediate code forms for expressions, Compilation of control structures, Code optimization- Local and Global.

Book of study:

System Programming & Operating systems- D M Dhamdhare (Tata McGraw Hill)

References:

System Programming - John J Donovan (Tata McGraw Hill)
Design of Compilers Aho & Ullman

BCS303: Database Management Systems (Core)

Module 1 (10 hrs)

Introduction: Characteristics of the Database approach Problems with file system data management Data models, Schemas and instances DBMS architectures- Data independencies Database languages and Interfaces DDL DML, DCL Database Administrator Duties.
Entity Relationship model -Entity sets, attributes and keys- Relationships, Relationship types and structural constraints Weak and strong entity- Enhanced Entity Relationship (EER) and object modeling.- specialization and generalization.

Module 2 (16 hrs)

Physical Data organization- Hashed files- Indexed files- B- Trees, sequential Organization files.
The relational Data model concepts-Relational model constraints- The Relational algebra- Tuple relational calculus, Domain relational calculus- SQL

Module 3 (10 hrs)

Database design- Functional dependencies- Basic definitions- Trivial and non trivial dependencies- Closure of a set of dependencies-closure of a set of attributes - Irreducible set of dependencies- Non loss decomposition and functional dependencies First, Second and Third Normal forms- Boyce Codd Normal forms.

Module 4 (13 hrs)

Transaction processing- Desirable properties of transactions- Serializability of schedules Concurrency control techniques- Locking techniques- Time stamp Ordering and multi version techniques- Database recovery techniques- Recovery techniques based on deferred updates and immediate update, shadow paging-Database Security and Authorization-Access control based on granting/Revoking of privileges.

Module 5 (15 hrs)

References

1. Structured Computer Organisation-Andrew s Tannenbaum
2. Computer Organisation and Architecture-William Stallings

**BCS306: Software Lab III (RDBMS ORACLE) (Core)**

Basics: Connecting to RDBMS Server- user login invoke SQL plus.

SQL plus: Naming a table- assigning storage data types- Display formats- creating tables- Creating tables from other tables- Creating Synonyms-Describing Table Structures-Commands Changing table structures-Altering and dropping tables-Manipulating data in tables- Inserting data into tables Using UPDATE to change

data- DCL commands- GRANT, REVOKE, COMMIT, ROLLBACK-AUTOCOMMIT Deleting rows (20 hours)

Adding columns- saving and retrieving SQL commands- Editing SQL commands
And SQL*plus commands (8 hours)

Query: Querying single tables- Projection, selection- Ordering, grouping results-accessing records from multiple tables-Subqueries-Correlated subqueries-Connecting Queries. (14 hours)

Views: Defining a view-granting view access to others-Querying views- creating synonyms-Defining multiple view with JOIN and without JOIN- Inserting, deleting and updating data through views- dropping views (10 hours)

PL/SQL: simple program using control structures-Cursors-Exceptions-Triggers-Procedures-Functions (12 hours)

Book of Study:

- 1) Understanding Oracle-James T perry & Joseph G Lateer
- 2) Sql, Pl/sql- Programming Language of Oracle -Ivan Bayross 2nd revised edition 2002 -BPPB Publication.
- 3) Oracle a beginners guide- Michel Abbey & Michael J Corey
- 4) Oracle 9i The complete reference- Loney & Koch TMH Publication -2002

SEMESTER 4**BCS401: VISUAL PROGRAMMING (Core)****Module 1(6hrs)**

Introduction to Windows , GUI concept, Concept of Event driven programming, The Visual Basic IDE(5.50) ,Types of Visual Basic Projects, Visual Basic Editions, The Visual Basic Project Lifecycle, Project Files.

Module 2(22hrs)

Programming Elements Data types- Constants- Variables- operators user defined data types-Library Functions- Program Comments- Arrays Dynamic Arrays-Strings- Enumerations. Logic Statements Conditional Constructs (if / Then, Select Case),Iteration (Do Loop, For Loop, DoEvents- Exit, Stop and End. Functions and Subroutines- Arguments ByRef vs. ByVal Parameters- Optional Arguments- Module Basics-Event Procedures- Class Modules. Types of Errors,Error handling, Creating Error Handlers- Debugging Debugging Tools.

Module 3(14hrs)

Forms- Controls, Control arrays, menus, menu editor, Graphics programming, Simple animation

SDI, MDI Applications

Database Concepts- Visual data manager ,The ADO Data Control-Data Grid Control DBList and DBCombo Controls Data view Window- Data form Wizard Data Environment Designer.

Module 4 (10hrs)

Report using Crystal Reports, data environment Reports using reports- Error handling Creating Active X controls, Active EXE, Active X DLL.

Module 5(12hrs)

Introduction to the Web- Internet & Web Protocols- HTML, Structure of HTML documents, Attributes, Basic HTML Tags, Forms and Controls, VB Scripts, DHTML, DHTML object model,ASP,ASP object model.

Book of study :

1. Francesco Balena; Programming MS VB 6. 0, WP Publishers and Distributors (p) Ltd South Asian Edition.
2. Evangelos Petroutsos; Mastering Visual Basic 6, BPB Publishers First Editions, Reprinted 2005.
3. Deitel& Detiel, T. R. Nieto; VB 6 How to Program, Pearson Education.
4. Peter Norton; Guide to Visual Basic 6, Tech-Media.
5. Bob Reselman, Richard Peasley ; Using VB 6, PHI.

BCS402: Microprocessors and Assembly Language Programming (Core)**Module 1 (10 hrs)**

Microprocessor architecture and its operations microprocessor initiated operations and 8085 bus organization, internal data operations, 8085 registers, externally initiated operations. Memory memory map, memory and instructions, peripheral mapped I/O.
8085 microprocessor and its architecture.

Module 5(14 hrs)

Sequencing models: Processing of n jobs through m2 machines, n jobs through 3 machines, 2 jobs through m machines, maintenance crew scheduling.

Book of study:

Operations Research ♦ Kanti Swarup, P.K. Gupta, Man Mohan (Sultan Chand & Sons)

References:

1. Operations Research: An Introduction ♦ Hamdy A. Taha (Prentice Hall of India)
2. Introduction to Operations Research: Computer oriented Algorithmic (Mc Graw Hill 1976)
3. Quantitative Techniques in Management ♦ Volma N.D (T.M.II 1990)
4. Operations Research for management ♦ Shenoy G. VSrivastava & Sharma (Wiley Eastern II edition)

BCS502 : System Analysis And Design**Module 1 (10 hrs)**

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.

Module 2 (14 hrs)

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.

Module 3 (12 hrs)

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

Module 4 (10 hrs)

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

Module 5 (10 hrs)

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

Module 6 (8 hrs)

Operation phase: Operation phase activities; change over crisis; change over activities; routine operations; security; performance evaluation.

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.

BCS503 : PROGRAMMING IN JAVA**Module I (12 Hours)**

Brief History of Java , Feature of Java , JDK , Data Types , Operators ,Control Structures in JAVA , Arrays , The JAVA Class , Constructor , Finalizers , Classes inside Classes .

Module II (10 Hours)

3. Shell programming ♦ shell variables , read,echo,command line arguments && ,||,if, while case,for, until, test,set,shift , trape(8 hrs)
 4. System administration ♦ booting ,init,runlevels ,creating users and groups , system databases ♦ password ,group ,shadow,init tab ,inetd.conf-startup scrip
♦ shutdown ♦ mount ♦ fsck ♦ network administration ♦ net stat, ping , traceroute, ifconfig ♦ telnet and ftp (6hrs)
 5. X-windows systems ♦ concepts ,window managers ,KDE and GNOME ♦ setting up servers ♦ DHCP ♦ DNS ♦ NFS-proxy- apache ♦ samba (2hrs)
- Part B- Java Project (38 hrs)

SEMESTER VI

BCS601 :♦♦ Parallel Processing

Module 1(12 hrs)

Introduction to parallel processing: Parallelism in uniprocessor systems, parallel computer structures, Architectural classification schemes (Flynn♦s, Feng♦s and handler♦s), parallel processing applications.

Module 2(16 hrs)

Pipelining and vector processing: Linear pipelining, classification of pipeline processors, Instruction and arithmetic pipelines, principles of designing pipelined processors, characteristics of vector processing

Module3 (14hrs)

Structures and algorithms for Array processors: SIMD array processors, SIMD interconnection networks, parallel algorithms for array processors

Module4 (16 hrs)

Multiprocessor architecture and programming: functional structures of multiprocessor systems, interconnection networks, multiprocessor operating systems, interprocessor communication mechanisms

Module5(14 hrs)

Dataflow computers: Distinction between control flow and data flow computers, data flow graphs and languages, advantages and disadvantages of dataflow computers, dataflow computer architectures

Book of study

Computer Architecture and parallel processing-Kai Hwang and F A Briggs

References

1. Introduction to Computer Architecture-Stone H S(Galgotia publishers)
2. The Architecture of pipelined computers-Koggi H(Mc Graw Hill)

BCS602 : COMPUTER GRAPHICS AND MULTIMEDIA

Module 1(12 hrs)

Overview of Graphics System: display devices, raster scan systems, random scan systems, input devices, graphics software.

Output Primitives: points and lines, line drawing algorithms, DDA, Bresenhams line algorithm, circle generating algorithms,♦ Bresenhams, Mid-point, Filled area primitives.

Module 2(18 hrs)

Attributes of Output Primitives: Line, Curve, Area fill, Character text, Marker Antialiasing. 2D Transformations: Basic transformations, Matrix representations and Homogeneous co-ordinates, Composite transformations, Reflection, Shear. 2D Viewing: viewing pipeline, window to viewport co-ordinate transformations, clipping operations, point, line-Cohen Sutherlands, polygon clipping-Hodgemans, Weilor-Atherton, curve, text.

Module 3(16 hrs)

Structures: concepts, basic modeling concepts, interactive graphics, logical classification of input devices, input functions, interactive picture construction techniques. 3D Concepts: Introduction to 3D graphics, display methods, 3D representations-polygon surfaces.

Module 4(16 hrs)

Definition of Multimedia ; Applications, Hardware and Software requirements for creating multimedia ; Building blocks of multimedia ♦ text, graphics(image), video, audio, animation ; Different types of animation ; Brief overview of stages in execution of multimedia project ♦ pre production, production and post production phases.

Module 5(12 hrs)

What is Compression ; Lossy and Lossless compression ; Compression techniques ♦ RLE in text and image, LZW, Huffman♦s Coding, GIF, JPEG, MPEG, Fractal, Wavelet ; Image Filetypes; Advanced Multimedia ♦ Virtual Reality, Augmented Reality, Video Conferencing, Morphing, voIP, Video on Demand .

Books of study:

1. Computer Graphics ♦ Hearn & Baker-Pearson Prentice Hall, 2005.
- 2.♦♦ Multimedia : Making It Work -♦ Tay Vaughan ♦ 5th Edition ♦ Tata Mc Graw Hill♦♦♦♦

References

1. Computer Graphics Principles and Practice- Foley, Van Dam, Feiner, Hughes.♦♦♦♦♦

BCS603(C): Image Processing

Unit 1: Introduction ♦ steps in image processing, Image acquisition, representation, sampling and quantization, relationship between pixels. ♦ color models ♦ basics of color image processing.

Unit 2: Image enhancement in spatial domain ♦ some basic gray level transformations ♦ histogram processing ♦ enhancement using arithmetic , logic operations ♦ basics of spatial filtering and smoothing.

Unit 3: Image enhancement in Frequency domain ♦ Introduction to Fourier transform: 1- D, 2 ♦D DFT and its inverse transform, smoothing and sharpening filters.

Unit 4: Image restoration: Model of degradation and restoration process ♦ noise models ♦ restoration in the presence of noise- periodic noise reduction.. Image segmentation: Thresholding and region based segmentation.

Unit 5 : Image compression: Fundamentals ♦ models ♦ information theory ♦ error free compression ♦Lossy compression: predictive and transform coding. JPEG and MPEG standard.

♦Book of Study:

R.C. Gonzalez, R.E.Woods, 2002, Digital Image processing, 2nd Edition, Pearson Education.

Reference Books

- (i) Anil K. Jain, 1994, Fundamentals of Digital image Processing, 2nd Edition, Prentice Hall of India, New Delhi.
 - (ii) Pratt. W.K., Digital Image Processing, 3rd Edition, John Wiley & Sons.
 - (iii) Rosenflad A. & Kak, A.C, 1982, Digital Picture Processing, vol .I & II, Academic Press.
3. Website, E-learning resources
(i) <http://www.imageprocessingplace.com/DIP/dip-downloads/>

BCS603(D): BIO-INFORMATICS

Unit 1: Fundamental Of Biological Systems: Cell- cell organelles- Eukaryotic, Prokaryotic cell- Cell division- Mitosis- Meiosis- Macromolecules: Carbohydrates- Protein- Lipids- Nucleic acid- Structure of DNA and RNA Virology- Structure of HIV- AIDS- Cancer/ Oncogenes

Unit 2: Fundamentals Of Bioinformatics: Definition- Bioinformatics in industrial applications- Importance of Bioinformatics- Genomics- Types of Genomics- Proteomics- Sequence analysis- Sequence alignment- Hidden Markov Model- Types of Alignment- BLAST- FASTA- Interpro- Cog

Unit 3: Biocomputing And Bioprogramming: Rasmol- Clustalw- Biological databases- Nucleotide sequence database- Protein sequence database- EMBL DDBJ- Genalysis- Introduction to PERL and Bio-PERL- Introduction to SQL commands.

Unit 4: Linux And Unix For Bioinformatics: Basic Unix commands- Basic Linux commands- Web resources in Bioinformatics.

Unit 5: Applied Bioinformatics: Commercial Bioinformatics- Definition for Bioinformatics company- Transcriptome- SNP♦s and their applications- Patenting and data generation from Patent literature for commercial benefits- PR and Bioinformatics.

Book of Study

- ♦(i) V. R.Srinivas, 2005, Bioinformatics ♦ A modern approach, Prentice Hall of India, New Delhi.
- (ii) J Watson, Molecular Biology of the Cell. (Unit ♦ 1)
- (iii) A. Batiza, A. Finney, Schacter, Bernia Mullis, Kary B, 2005, Bioinformatics, Genomics, Proteomics: Getting the Big Picture, Chelsea House Publications, New York, (Unit ♦ 2)
- (iv) H. Rashidi, 2000, Bioinformatics Basics, CRC Press Ltd. (Unit - 2)
- (v) Moorhouse, Michae Barry, Paul, 2004, Bioinformatics, Biocomputing and Perl: An Introduction to Bioinformatics Computing Skills and Practice, John Wiley & Sons. (Unit ♦ 3)
- (vi) Cynthia Gibas, Per Jambeck, 2001, Developing Bioinformatics Computer software, O♦Reilly Publications, Sebastopol, USA (Unit ♦ 3)

2. Websites, E-learning materials

(i) <http://www.bioinformaticsonline.org/ch/cho1/index.html>

BCS604: SEMINAR

BCS605: PROJECT