



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

With effect from the Session 2019-2020

Semester - I										
Sl. No.	Course Code	Course Title	Credit	Marks			No. of Hours			
				IA	ESE	Total	L	T	P	
1	CC-01	Computer Fundamental and PC Software	6	20	80		100	3	1	4
					T:50	L:30				
2	CC-02	Introduction to C Programming	6	20	80		100	3	1	4
					T:50	L:30				
3	GE-01	Mathematics-I	6	20	80		100	3	1	-
					T:80	L:00				
4	AECC-01	Environmental Studies	2	20	80		100	3	1	-
					T:80	L:00				
Total in Semester-I			20	80	320	400	12	4	8	

Semester - II										
Sl. No.	Course Code	Course Title	Credit	Marks			No. of Hours			
				IA	ESE	Total	L	T	P	
1	CC-03	Digital Logic	6	20	80		100	3	1	4
					T:50	L:30				
2	CC-04	Object Oriented Programming using C++	6	20	80		100	3	1	4
					T:50	L:30				
3	GE-02	Principals of Accounting and Costing	6	20	80		100	3	1	4
					T:50	L:30				
4	AECC-02	English Language and Communication	2	20	80		100	3	1	-
					T:80	L:00				
Total in Semester-II			20	80	320	400	12	4	12	



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Semester - III										
Sl. No.	Course Code	Course Title	Credit	Marks			No. of Hours			
				IA	ESE	Total	L	T	P	
1	CC-05	Operating System	6	20	80		100	3	1	4
					T:50	L:30				
2	CC-06	Database Management Systems	6	20	80		100	3	1	-
					T:80	L:00				
3	CC-07	Data Structure through C++	6	20	80		100	3	1	4
					T:50	L:30				
4	GE-03	Mathematics – II	6	20	80		100	3	1	-
					T:80	L:00				
5	SEC-01	<u>Choose Any One</u> <ul style="list-style-type: none"> • Android Programming • Web Programming 	2	20	80		100	3	1	4
					T:50	L:30				
Total in Semester-III			26	100	400	500	15	5	12	

Semester – IV										
Sl. No.	Course Code	Course Title	Credit	Marks			No. of Hours			
				IA	ESE	Total	L	T	P	
1	CC-08	Computer Networks	6	20	80		100	3	1	4
					T:50	L:30				
2	CC-09	Computer Graphics and Multimedia	6	20	80		100	3	1	4
					T:50	L:30				
3	CC-10	Theory of Computation	6	20	80		100	3	1	4
					T:50	L:30				
4	GE-04	Mathematics-III	6	20	80		100	3	1	-
					T:80	L:00				
5	SEC-02	<u>Choose Any One</u> <ul style="list-style-type: none"> • Wireless Mobile Communication • Database Programming with PL/SQL 	2	20	80		100	3	1	4
					T:50	L:30				
Total in Semester-IV			26	100	400	500	15	5	16	



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Semester - V										
Sl. No.	Course Code	Course Title	Credit	Marks			No. of Hours			
				IA	ESE	Total	L	T	P	
1	CC-11	Software Engineering	6	20	80		100	3	1	-
					T:80	L:00				
2	CC-12	Programming in Java	6	20	80		100	3	1	4
					T:50	L:30				
3	DSE-01	Introduction to Microprocessor and System Software	6	20	80		100	3	1	4
					T:50	L:30				
4	DSE-02	Data Warehousing and Data Mining	6	20	80		100	3	1	-
					T:80	L:00				
Total in Semester-V			24	80	320	400	12	4	8	

Semester - VI										
Sl. No.	Course Code	Course Title	Credit	Marks			No. of Hours			
				IA	ESE	Total	L	T	P	
1	CC-13	Internet Systems	6	20	80		100	3	1	4
					T:50	L:30				
2	CC-14	Intelligent Systems	6	20	80		100	3	1	4
					T:50	L:30				
3	DSE-03	Cloud Computing	6	20	80		100	3	1	-
					T:80	L:00				
4	DSE-04	Major Project & Viva-Voce	6	20	80		100	3	1	4
					T:80	L:00				
Total in Semester-VI			24	80	320	400	12	4	8	

Note:

SH = Science Honours, BCA = Bachelor of Computer Application, CC = Core Course, AECC = Ability Enhancement Compulsory Course, SEC = Skill Enhancement Course, GE = Generic Elective, DSE = Discipline Specific Elective, IA = Internal Assessment, ESE= End-Semester Examination, L = Lecture, T = Tutorial, and P = Practical



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

CONTENTS			
Sl. No.	Course Code	Course Title	Page No.
ABILITY ENHANCEMENT COMPULSORY COURSE:			
1	AECC-01	Environmental Studies	5
2	AECC-02	English Language and Communication	6
CORE COURSE:			
3	CC-01	Computer Fundamental and PC Software	7
4	CC-02	Introduction to C Programming	8
5	CC-03	Digital Logic	9
6	CC-04	Object Oriented Programming using C++	10
7	CC-05	Operating System	11
8	CC-06	Database Management Systems	13
9	CC-07	Data Structure through C++	15
01	CC-08	Computer Networks	16
11	CC-09	Computer Graphics and Multimedia	17
12	CC-10	Theory of Computation	19
13	CC-11	Software Engineering	19
14	CC-12	Programming in Java	20
15	CC-13	Internet Systems	21
16	CC-14	Intelligent Systems	22
DISCIPLINE SPECIFIC ELECTIVE:			
17	DSE-01	Introduction to Microprocessor and System Software	23
18	DSE-02	Data Warehousing and Data Mining	24
19	DSE-03	Cloud Computing	25
20	DSE-04	Major Project & Viva-Voce	26
GENERIC ELECTIVE:			
21	GE-01	Mathematics-I	39
22	GE-02	Principals of Accounting and Costing	39
23	GE-03	Mathematics-II	40
24	GE-04	Mathematics-III	41
SKILL ENHANCEMENT COURSE:			
25	SEC-01	Android Programming	42
26	SEC-01	Web Programming	42
27	SEC-02	Wireless Mobile Communication	45
28	SEC-02	Database Programming with PL-SQL	46



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Semester - I

Course Code : AECC-01

Course Title : Environmental Studies (2 Credit)

Theory: 60 Lectures

Unit-1: Introduction to Environmental Studies:

- Multidisciplinary nature of environmental studies
- Definition, Nature, Scope and Importance of environmental studies
- Types and Components of environment
- Sustainable development

Unit-2: Ecosystems:

- Concept of Ecology and Eco-system, Structure and Function of an Ecosystem
- Different types of ecosystem; Forest, Desert and Aquatic (Ponds and Oceans) Biomes
- Energy flow in the ecosystem, energy flow models
- Food chains, food webs and ecological pyramids
- Ecological Succession

Unit-3: Natural Resources: Renewable and Non- Renewable Resources:

- Land resources: Land degradation, Landslides, Soil erosion
- Forest resources: Uses, types and importance, deforestation and its effects, Forest bio diversity and tribal population
- Water resources: Distribution of water on Earth; Use and over-exploitation of surface and ground water; conflicts over water (international & inter-state)
- Energy resources: Renewable and Non-renewable energy sources; Use of alternative energy Sources

Unit-4: Biodiversity and conservation:

- Introduction – Definition: Levels of biological diversity: Genetics, Species and Eco-System Diversity, Biodiversity hot spots and mega biodiversity countries.
- Threats to biodiversity; Value (services) of biodiversity; man-wildlife conflicts, biological invasions
- Conservation of biodiversity: *In situ* and *Ex situ* conservation of biodiversity; Endangered and endemic species of India

Unit-5: Environmental Pollution:

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks.
- Solid waste management: Control measures of urban and industrial waste.
- Fireworks Pollution

Unit-6: Environmental Policies & Practices:

- Climate change, global warming, ozone layer depletion, acid rain and its impacts on human communities and agriculture
- Environment Laws: Environment Protection Act, 1986; Air (Prevention & Control of Pollution) Act, 1981; Water (Prevention and control of Pollution) Act, 1972; Wildlife Protection Act, 1972; Forest Conservation Act, 1920, 1988; International agreements: Montreal protocols, 1987 and Kyoto protocols, 1997 and Convention on Biological Diversity (CBD)
- Tribal populations and rights.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit 7: Human Communities and the Environment:

- Human population growth: Population Explosion, Impacts on environment, human health and welfare.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley
- Environmental ethics: Role of Indian and other religions and cultures in environmental Conservation
- Environment and human health: Concept of health and diseases (Vector Borne Diseases)
- Human Rights, Value Education, Role of Information Technology in Environment

Unit 8: Field Work (Project Work):

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification
- Study of simple ecosystems-pond, river etc.

Reference Books:

1. Singh, J. S. Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
2. Santra S. C. 2005. Environmental Science, New Central Book Agency (P) Ltd. Kolkata.
3. Singh, S. 1991. Environmental Geography, Prayag Pustak Bhawan, Allahabad.
4. Roy, S. 2003. Environmental Science, Publishing Syndicate, Kolkata
5. Environmental Studies—Prof S.V.S Rana.--Rastogi Publication.
6. Cunningham, W. P. Cooper, T.H.Gorhani,E&Hepworth,M.T.2001,Environmental Encyclopedia. JaicoPubl.House.Mumbai.1196p
7. Erach Bharucha, 2016. Text Book of Environmental Studies for Undergraduate Courses (Second Edition) for UGC. University Press.

Semester - II

Course Code : AECC-02

Course Title : English Language and Communication (2 Credit)

Theory: 60 Lectures

Unit-1: Use of language- Human and animals: Basic skills of language Learning, Listening, Speaking, Reading and Writing Definition, purpose and types of communication.

Unit-2: Communication Process: Encoding decoding, message, media-feedback in communication. Effective communication Barriers to Communication. Verbal and non-verbal Communication.

Unit-3: Business Communication: Group Discussion, Seminar, Report and Interview.

Unit-4: Writing Letters: Official and Business Writings- Applications for job- Resume, CV- Report writing.

Unit-5: Speaking and Presentation: Face to face talk advertisement and multimedia. Technical knowledge and skill in modern e-age communication various types of modern communication fax, e-mail, video, Internet, Whatsapp.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-6: Grammar and Grammatical Structures: Vocabulary – Punctuation, Narration – Transformation of sentences – question tags- Correction of errors.

Unit-7: English as a non-phonetic language sounds phonetics- phonetic transcription word stress.

Unit-8: Comprehension: Writing short composition, précis.

Unit-9: Practice and Assignment in the course modules.

Reference Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business Communication and Report Writing- Sharma, TMH.
3. English for technical Communication – Laxminarayana, Seitech.
4. Business Communication – Kaul, PHI.
5. Communication Skill – Ghanekar, EPH
6. English for the secretary- Yvonne Hoban – TMH
7. English Phonetics –Balashubrahmaniam.

Semester - I

Course Code : CC-01

Course Title : Computer Fundamental and PC Software (6 Credit)

Theory: 60 Lectures

Unit-I: Introduction: Introduction to computers, Evolution of computer, a brief history, Generation of computers, Classification of computers, The computer system, Application of computers.

Unit-II: Number system and logic gates: Introduction, Numbers systems, Conversion between numbers systems (Binary, Octal, Hexa, BCD system), Arithmetic system, Signed and unsigned no, Binary coding, Boolean Algebra, Laws, Logic gates, Simplification of Boolean Expression, K-map, Sum of product, Product of sum, Combination of Logic Gates.

Unit-III: Computer System Architecture: Introduction, Central Processing Unit, Communication between various units, Primary Memory (Memory Hierarchy, RAM, ROM), Secondary Storage (Magnetic tape, Magnetic Disk, Optical Disk)

Unit-IV: Introduction to Software: Definition of software, Classification of Software, Introduction to Operating System - Definition of OS, Functions of OS, basic concept of different type of OS-batch processing OS, Multitasking OS, Multi-user OS, Network OS, Application Software - Definition of Application Software, Types of Application Software, Programming Languages, Machine Language, Assembly Language, High Level Language.

Unit-V: Problem Solving: Flow Charts, Decision Tables and Pseudo Code.

Unit-VI: Overview of OS: Introduction to DOS, Internal and external commands, batch files (autoexec.bat, config.sys), Line editors, History of Windows (Windows 3.x to up-to-date version), Desktop, user interface



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

action, icon on desktop, closing windows, renaming icons, resizing windows (maximizing and minimizing). Control panel.

Unit-VI: Overview of MS-Word: Introduction to word, Overview, creating, saving, opening, importing, exporting, and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. Headings, styles, fonts and font size, editing, positioning, viewing texts, searching and replacing text, inserting page breaks, page numbers, bookmarks, symbols, and dates. Using tabs and table, header, footer, and printing, mail merge and labels.

Unit-VII: Overview of MS-Excel: Getting started with Excel, Worksheet overview, entering information, Editing cell, commands and functions, moving and copying, Inserting and deleting rows and columns, printing worksheet, Creating Charts, Naming range and using statistical, math, and financial function, database in a worksheet, Additional formatting commands and drawing toolbars, Other commands and functions

Unit-VIII: Overview of Power points: Slide creation with PowerPoint, Presenting shows for corporate and commercial using power point.

Unit-IX: Introduction to Internet: Basic internet terms, Getting connecting to internet, Internet applications, E-mails, Searching the web, Search engine, and computer viruses.

Reference Books:

1. Computer Fundamentals - P. K. Sinha
2. Rajaraman V. -Fundamentals of computers, Prentics hall of India.
3. Digital circuit and designs -S. Salivahanan, S. Arivazhagan - Vikash Publications.
4. Introduction to Computers with MS-Office-Leon, TMH

Semester - I

Course Code : CC-02

Course Title : Introduction to C Programming (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction to C: History of C, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C.

Unit-2: Data Types, Variables, Constants, Operators and Basic I/O: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar), Formatted and Console I/O (printf(), scanf()), Using Basic Header Files (stdio.h, conio.h).

Unit-3: Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-4: Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two- dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Unit-5: Derived Data Types (Structures and Unions): Understanding utility of structures and unions, declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

Unit-6: Pointers in C: Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values.

Unit-7: Memory Allocation in C: Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, storage of variables in static and dynamic memory allocation.

Unit-8: File I/O, Preprocessor Directives: Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives.

Reference Books:

1. C: The Complete Reference, Herbtz Schildt, Fourth Edition, McGraw Hill.2003
2. Programming in C - B. S. Gottfried (Sahaum Series)
3. Programming in ANSI C- E. Balaguruswami (TMH)
4. Let us C, Y Kanetkar, BPB

Semester - II

Course Code : CC-03

Course Title : Digital Logic (6 Credit)

Theory: 60 Lectures

Unit I: Introduction to number system: Digital system, Binary numbers, Number base conversation, Positional number system, Binary, Octal, Hexadecimal and decimal number system, Representation of signed numbers and signed magnitude, Binary arithmetic: Binary Addition, Binary Subtraction, Binary multiplication, Binary division, Complementary number system: 1's and 2's complement, Binary subtraction using 1's complement method, binary subtraction using 2's complement, Various binary codes: BCD, Excess-3, Gray code, BCD addition.

Unit II: Boolean algebra and Logic gates: Introduction to Boolean algebra -Addition and Multiplication in Boolean algebra: Binary logic function, Logic gates and Truth tables; AND logic, OR logic, NOT logic, NAND logic, NOR logic, EX-OR logic, EX-NOR logic, Boolean rules and Laws, De-Morgan's theorem.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit III: Gate level minimization: Realization of switching function using logic gates -Canonical forms, Standard forms, Sum of product forms, Product of sum forms, universal gates: NAND and NOR gates as universal gates, Realization of Boolean function using universal gates. The map method: Three variable map, Four variable map, Logic expression simplification with grouping cell, Quine-McClusky method, realization combinational circuit using truth tables.

Unit IV: Analysis and Design of combinational circuit: Introduction -Binary Adders: Half adder, Full adder; Binary Subtractor, Half Subtractor, Full Subtractor; Parallel binary adder, Binary comparator or Magnitude comparator, Decoders, Encoders, Multiplexer and De-multiplexer, Parity generator and Parity checkers, Code convertor.

Unit V: Latches and Flip-Flops: Latches: Active High S-R Latch (NOR gate S-R latch), Active Low S-R latch (NAND gate S-R latch), Gated S-R Flip-Flop, D-flip-flop, Edge triggered flip-flop: Edge Triggered S-R FF, Edge Triggered D-ff, Edge Triggered J-K flip-flop, Race condition, Master slave J-K flip-flop.

Unit VI: Counters and Registers: Introduction to Three bit Asynchronous counter, Four bit asynchronous counter, ripple counter, Three Bit synchronous binary up counter, Three Bit synchronous binary down counter, Four Bit synchronous binary up counter, Four Bit synchronous binary down counter, Serial In and Serial Out register, Universal Shift register.

Unit VII: Memory and Programmable Logic: Introduction: Random Access memory, Read only memory, Programmable logic array, Sequential programmable devices.

Reference Books:

1. Digital Design, M. Morris Mano, Pearson education.
2. Digital Circuit and Designs -S. Alivahanan, S. Arivazhagan - Vikash Publications.
3. Modern Digital Electronics: R. P Jain.

Semester - II

Course Code : CC-04

Course Title : Object Oriented Programming using C++ (6 Credit)

Theory: 60 Lectures

Unit-1: Evolution of Programming methodologies: Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Selection control statements in C++.

Unit-2: Data types, Expression and control statements Iteration statements in C++, Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions.

Unit-3: Functions: Introduction to functions, Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C++.

Unit-4: Creating classes and Abstraction: Declaration of classes and objects, data members, member functions, this Pointer, Friends, Friend Functions, Friend Classes, Friend Scope, and Static Functions, Objects as function arguments, Arrays of objects, returning objects from function, structures and classes,



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-5: Constructors and Destructors: Constructors, Basic constructors, parameterized constructors, constructors with default argument, dynamic initialization of objects, copy constructors, dynamic constructors, destructors, constraints on constructors and destructors.

Unit-6: Operator Overloading: Overloading unary operators, binary operators and arithmetic operators, multiple overloading, comparison operators, conversion between objects and basic types, conversion between objects of difference classes, constraints on type conversion.

Unit-7: Derived Classes and Inheritance: Derived classes and base classes, defining a derived class, accessing base class member, Protected access specifier, derived class constructors, overriding the member function, class hierarchies, abstract base class, constructors and member function, public and private, access combinations and usage of access specifiers, classes and structures, Multiple Inheritance

Unit-8: Pointers: Pointers to objects, Virtual Functions, Polymorphism, Abstract classes.

Unit-9: Files and streams in C++: Character and String input and output to files, Command Line Arguments and Printer Output.

Unit-10: Standard input and output operations: C++ iostream hierarchy, Standard Input/output Stream Library, Organization Elements of the iostream Library, Programming using Streams, Basic Stream Concepts.

Unit-11: File input and output: Reading a File, Managing I/O Streams, Opening a File – Different Methods, Checking for Failure with File Commands, Checking the I/O Status Flags, Dealing with Binary Files, Useful Functions.

Unit-12: Templates: Function templates and class templates

Unit-13: Standard Template Library: Containers, iterators and application of container classes.

Unit-14: Exception handling: Throwing an exception, catching an exception: The try block, Exception handlers, Termination vs. Resumption, Exception specification, rethrowing an exception, uncaught exceptions, Standard exceptions, Programming with exceptions.

Reference Books:

1. Object Oriented Programming through C++ E. Balagurusamy, TMH
2. C++: The Complete Reference, Herbtz Schildt, Fourth Edition, McGraw Hill.2003
3. C++ Primer, Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, Published by Addison- Wesley, 5th Edition, 2012

Semester - III

Course Code : CC-05

Course Title : Operating System (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction: Definition and functions of Operating System, Evolution of Operating Systems-Simple Batch Operating Systems, Multi-programmed Batched Operating Systems, Time-Sharing operating Systems, Personal Computer Operating Systems, Multi-processor Operating



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Systems, Distributed Systems, Real-Time Systems; Operating system structures-Layered approach, The kernel based approach, The virtual machine approach.

Unit-2: Operating System Architecture: Operating System as an Extended Machine, Layered Approach, Micro-Kernels, UNIX Kernel Components, Modules, Introduction to Virtual Machines, Virtual Environment & Machine Aggregation, Implementation Techniques.

Unit-3: Process Management: Process, Process State, Process Control Block, Process Scheduling, Operation on processes, Co-operating Processes, Threads.

Unit-4: CPU Scheduling Algorithms: Basic Concepts of Scheduling: CPU-I/O Burst Cycle. CPU Scheduler, Pre-emptive / non pre-emptive scheduling, Dispatcher, Scheduling Criteria; Scheduling Algorithms, First come First Served Scheduling, Shortest-Job-First Scheduling, Priority Scheduling. Round-Robin Scheduling, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling, Multiple-Processor Scheduling, Real-Time Scheduling; Evaluation of CPU Scheduling Algorithms-Deterministic Modelling, Queuing Models, Simulations, Implementation.

Unit-5: Process Synchronization: Inter process Communication; Basic Structure, Naming: Direct Communication; Indirect Communication, Buffering; The Critical-section problem: Two Process Solution; Multiple Process Solutions; Semaphores; Monitors; Hardware Assistance.

Unit-6: Deadlocks: System Model, Deadlock Characterization, Deadlock Handling; Deadlock Prevention, Deadlock Avoidance-Safe State, Resource-Allocation Graph Algorithm, Banker's Algorithm; Deadlock Detection-Single Instance of a Resource, Multiple Instances of a Resource and Recovery from Deadlock.

Unit-7: Memory Management: Logical versus Physical Address Space Swapping; Contiguous Allocation-Single partition Allocation, Multiple Partition Allocation, Fragmentation; Paging-Concept of paging, Page Table Implementation; Segmentation-Concept of Segmentation, Segmentation Hardware, External Fragmentation.

Unit-8: Virtual Memory: Need for Virtual Memory Technique; Demand Paging; Page Replacement; Page Replacement Algorithms-FIFO Page Replacement Algorithm, Optimal Algorithm; LRU page Replacement Algorithm; Thrashing-Causes for Thrashing, Working Set Model, Page Fault Frequency.

Unit-9: File System Interface and Implementation: Concept of a File- Attributes of a File, Operations on Files, Types of Files; Structure of File; File Access Methods-Sequential Access, Direct Access, Indexed Sequential Access; Directory Structure: Single Level Directory, Two Level Directory; Tree Structured Directories; Allocation Methods- Contiguous allocation, Linked allocation, Indexed allocation, Performance comparison; Free Space Management, Directory Implementation.

Unit-10: Input-Output Architecture: I/O Structure, I/O Control Strategies-Program controlled I/O, Interrupt-controlled I/O, Direct memory access; The I/O Address Space.

Unit-11: Operating Systems in Distributed Processing: Centralized and Distributed Processing, Network Operating System (NOS) Architecture, Functions of NOS, Global Operating System (GOS), Remote Procedure Call (RPC), Distributed File Management.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-12: Security and Protection: Attacks on Security, Computer Worms, Computer Virus, Security Design Principles, Authentication, Protection Mechanism, Encryption, Security in Distributed Environment.

Unit-13: Unix Editors and commands: ed editor, vi editor, Redirections, piping, tees, filters, UNIX utilities: grep, sed, awk, tr etc.

Unit-14: Introduction to Shell scripts: Bourne shell, C shell, Shell variables, Scripts, meta-characters and environments, if and case statements, for, while and until loops.

Unit-15: Awk programming: Awk arithmetic and variables, Awk built-in variable names and operators, arrays, strings.

Reference Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8 th Edition, John Wiley Publications 2008.
2. A. S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles, 5 th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and Design, Tata McGraw Hill 1992.
6. Y. Kanetkar, Unix Shell Programming, BPB.
7. Sumitabha Das, UNIX, Concepts and Applications, Mcgraw Hill
8. Sed and Awk, Dale Dougherty and Arnold Robbins, O'REILLY

Semester - IV

Course Code : CC-06

Course Title : Database Management Systems (6 Credit)

Theory: 60 Lectures

Unit-1: Database Management System Concepts: Introduction, Significance of Database, Database System Applications; Data Independence; Data Modeling for a Database; Entities and their Attributes, Entities, Attributes, Relationships and Relationships Types, Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS.

Unit-2: Database System Architecture: Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; MySQL Architecture; SQL Server 2000 Architecture; Oracle Architecture; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Management System Structure, Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture

Unit-3: Database Models and Implementation: Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model, Object/Relational Model, Object-Oriented Model; Entity-Relationship Model, Modeling using E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types; Associative Database Model



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-4: File Organization for Conventional DBMS: Storage Devices and its Characteristics, Magnetic Disks, Physical Characteristics of Disks, Performance Measures of Disks, Optimization of Disk-Block Access; File Organization, Fixed-Length Records, Variable-Length Records, Organization of records in files; Sequential file Organization; Indexed Sequential Access Method (ISAM); Virtual Storage Access Method (VSAM)

Unit-5: An Introduction to RDBMS: An informal look at the relational model; Relational Database Management System; RDBMS Properties, The Entity-Relationship Model; Overview of Relational Query Optimization; System Catalog in a Relational DBMS, Information Stored in the System Catalog, How Catalogs are Stored

Unit-6: SQL: Categories of SQL Commands; Data Definition; Data Manipulation Statements, SELECT - The Basic Form, Sub queries, Functions, GROUP BY Feature, Updating the Database, Data Definition Facilities, Views; Embedded SQL *, Declaring Variables and Exceptions, Embedding SQL Statements, Transaction Processing, Consistency and Isolation, Atomicity and Durability

Unit-7: Relational Algebra: Basic Operations, Union (U), Difference (-), Intersection (\cap), Cartesian Product (\times); Additional Relational Algebraic Operations, Projection (π), Selection (σ), JOIN (), Division (\div)

Unit-8: Relational Calculus: Tuple Relational Calculus, Semantics of TRC Queries, Examples of TRC Queries; Domain Relational Calculus; Relational ALGEBRA vs Relational CALCULUS

Unit-9: Normalization: Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; First Normalization; Second Normal Form Relation; Third Normal Form; Boyce-Codd Normal Form (BCNF); Fourth and Fifth Normal Form

Unit-10: Query Processing and Optimization: Query Interpretation; Equivalence of Expressions; Algorithm for Executing Query Operations, External sorting, Select operation, Join operation, PROJECT and set operation, Aggregate operations, Outer join, Heuristics in Query Optimization, Semantic Query Optimization, Converting Query Tree to Query Evaluation Plan, Cost Estimates in Query Optimization, Measure of query cost, Catalog information for cost estimation of queries, Join Strategies for Parallel Processing, Parallel join, Pipelined multiway join, Physical organisation.

Unit-11: Distributed Databases: Structure of Distributed Database; Trade-offs in Distributing the Database, Advantages of Data Distribution, Disadvantages of Data Distribution; Design of Distributed Databases, Data Replication, Data Fragmentation

Unit-12: Object Oriented DBMS: Next Generation Data Base System, New Database Application; Object Oriented Database Management System; Features of Object Oriented System; Advantages of Object Oriented Database Management System; Deficiencies of Relational Database Management System; Difference between Relational Database Management System and Object Oriented Database Management System, Alternative Object Oriented Database Strategies

Unit-13: Object Relational Mapping: Significance of Mapping; Mapping Basics; Mapping a Class Inheritance Tree; Mapping Object Relationships, Types of relationships, Implementation of object relationships, Implementation of relational database relationships, Relationship mappings, Mapping ordered collections, Mapping recursive relationships, Modelling with Join Tables, Open Source Object Relational Mapping Software.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Reference Books:

1. An Introduction to Database Systems, Vol.I & II – C. J. Date, Addison Wesley.
2. Database System Concepts, 3rd edn. – Corth & Siberschatz, T.M.H
3. Principles of Database Systems, 2nd edn. – J.D. Ullman, Galgotia
4. Fundamentals of Database Systems, R. Elmasri, S.B. Navathe, 6th E, PE, 2010
5. Database Management Systems, R. Ramakrishanan, J. Gehrke, 3rd E, MGH, 2002
6. Fundamentals of SQL – Evan Bayross.

Semester - III

Course Code : CC-07

Course Title : Data Structure through C++ (6 Credit)

Theory: 60 Lectures

Unit-1: Analysis of Algorithm: Introduction to Algorithm Design and Data Structures: Design and analysis of algorithm: Algorithm definition, comparison of algorithms. Top down and bottom up approaches to Algorithm design. Analysis of Algorithm; Frequency count, Complexity measures in terms of time and space. Structured approach to programming.

Unit-2: Elementary Data Structures-I (Arrays): Representation of arrays: single and multidimensional arrays. Address calculation using column and row major ordering. Various operations on Arrays, Vectors. Application of arrays: Matrix multiplication, Sparse polynomial representation and addition, Stacks and Queues: Representation of stacks and queues using arrays, Circular queues, Priority Queue and D-Queue, Applications of stacks and Queues, Conversion from infix to postfix and prefix expressions, Evaluation of postfix - 95 - expression using stacks. Pointers: Definition, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers.

Unit-3: Elementary Data Structures-II (Linked Lists): Linked list: Singly linked list; operations on list, Linked Stacks and Queues: Representation of stacks and queues using Link List. Polynomial representation and manipulation using linked lists. Circular linked lists, Doubly linked lists. Generalized list structure. Sparse Matrix representation using generalized list structure.

Unit-4: Abstract Data types Stacks and Queues: Definition of ADT, Stack ADT (array implementation), FIFO queue ADT (array implementation)

Unit-5: Trees: Binary tree traversal methods: Preorder, In-order, Post-ordered traversal. Recursive Algorithms for above mentioned Traversal methods. Representation of trees and its applications: Binary tree representation of a general tree. Conversion of forest into tree. Threaded binary trees. Binary search tree. : Height balanced (AVL) tree, B-trees.

Unit-6: Searching, Sorting and Complexity: Selection sort, Insertion sort, Bubble sort, Quick sort, merge sort, Heap sort, Radix sort and their complexity, Searching: Sequential search, Binary Search, Binary Search Tree, ASVL trees, B trees, Searching , sorting and complexity, Searching : Sequential and binary searches, Indexed search, Hashing Schemes. Sorting: Insertion, selection, bubble, Quick, merge, radix, Shell, Heap sort, comparison of time complexity.

Unit-7: Graphs: Graph representation: Adjacency matrix, Adjacency lists, Traversal schemes: Depth first search, Breadth first search. Spanning tree: Definition, Minimal spanning tree algorithms. Shortest Path algorithms (Prime's and Kruskal 's).



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Reference Books:

1. Hubbard John. R, "Schaum's outline of Data Structures with C++", Tata McGraw-Hill, 2007.
2. Langsam Y., Augenstein M. J and Tanenbaum A. M, "Data Structures Using C and C++", Second Edition, Pearson Education, 2007.
3. Kruse R, Tonodo C.L. and Leung B, "Data Structures and Program Design in C", Pearson Education, 2007.
4. Horowitz E, Sahni S and Mehta D, "Fundamentals of Data Structures in C++," Galgotia Publication, 2009.
5. Sartaj Sahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
6. Weiss M A, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2007
7. Litvin G, "Programming with C++ and Data Structures", Vikas Publishing House.

Semester - IV

Course Code : CC-08

Course Title : Computer Networks (6 Credit)

Theory: 60 Lectures

Unit-1: Data Communications: Introduction, Communication Systems, Signal and data, Transmission modes, Synchronous and asynchronous transmission, Circuits, channels and multi channeling, Signaling, Encoding and decoding, Error detection and Recovery, Flow control, Sliding Window, Congestion Management, Multiplexing [FDM, TDM, CDM, WDM] and Spreading [DS. FH], Concept of Modulation, Baseband versus Broadband; Pulse Code Modulation (PCM), Shift Keying [ASK, FSK, PSK, QPSK, DPSK]; Encoding techniques and CODEC; Classification of Modems, Standards and Protocols, Protocols used by Modem to Transfer files, Establishing a Connection (Internet connectivity); Digital Subscriber Loop (DSL)

Unit-2: Communication Network Fundamentals: Introduction, Switching techniques: Circuit Switching, Packet switching, Datagram, Virtual circuit and Permanent Virtual Circuit, Connectionless and connection oriented communication, Message switching, Cell switching (ATM); Telephone network signaling Network topologies, Layering the communication process, Open Systems Interconnection (OSI) model, Data encapsulation; Protocols, services and layering, PDU/SDU; TCP/IP suite, Hour-glass model, Internet Architecture and Protocol overview.

Unit-3: Media Access Control: Introduction, Access Techniques (STDM, FDMA, TDMA, Spread Spectrum techniques and CDMA, DSSS, FHSS), Media Access Control, Aloha and Slotted Aloha, Media Access Control Address, Polling, CSMA, CSMA/CA, CSMA/CD and Reservation Aloha, Digital hierarchies [SONET/SDH]

Unit-4: Network Components: Introduction, LAN Hardware, LAN Operating Systems, Transmission Media: Guided Media (Twisted pair, Co-axial cable, Optical fiber), Unguided Media (Radio, VHF, microwave, satellite, Infrared); Fiber Optics Communication Components (Source, Channel Detector).

Unit-5: Layered Protocols OSI Model: Goals of layered protocols, network design problems, communication between layers, introduction to standard organizations and the OSI model, standards organizations, Layers of OSI, OSI status.

Unit-6: Switching and Routing in Networks: Message switching, packet switching, when and when not to use packet switching, packet routing, and packet switching support to circuit switching networks.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-7: Link Control and MAC Protocols: Framing, Error Detection and Correction; Window-based Flow Control; Logical Link Control, HDLC Protocol, Point-to-Point Protocol (PPP), X.25 CCITT standard for packet data transmission; Media access control, Random Access Techniques, Scheduling Mechanisms.

Unit-8: Local Area Network (LAN): LAN topologies and protocols; IEEE 802 Standard; Ethernet (Standard, Fast, Gigabit), Token Ring, FDDI, Wireless LANs (802.11x); Connecting LANs: Repeaters, Bridges, Switches, Routers; Virtual LANs

Unit-9: Wide Area Network (WAN): Network Layer Addressing and Routing concepts (Forwarding Function, Filtering Function); Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing); Distance Vector Protocol, Link State protocol, Open Shortest Path First (OSPF); Internet Protocol (IP): Addressing & Routing; Internet Control Message Protocol, (ICMP), Address Resolution Protocol (ARP), Dynamic Host Control Protocol (DHCP), Network Address Translation (NAT), IPv6, Mobile IP, Process-to-Process delivery in Transport Layer: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), congestion control, TCP/IP Reference Model and internetworking, example of TCP/IP operations, related protocols, Concept of ports and sockets.

Unit-10: The X.25 and supporting protocols: Features of X.25, Layers of X.25 and the physical layer, X.25 and the data link layer, X.25 standards, X.25 channel options, flow control principles.

Unit-11: Application Protocols: Client/Server Model, Network File System (NFS), Remote Login: Telnet; File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP); E-mail system: Simple Mail Transfer Protocol (SMTP), Post Office Protocol (POP); World Wide Web (WWW), Domain Name System (DNS), DNS servers; Hyper Text system: Hyper Text Transfer Protocol (HTTP), Hyper Text markup Language (HTML)

Unit-12: Wireless Networks: Radio Communications, Cellular Radio, Mobile Telephony (GSM & CDMA), Satellite Networks (VSAT), Mobile Adhoc Networks (MANET)

Unit-13: Security and Management: Cryptography, IPsec, SSL/TLS, PGP, secure HTTP, proxy, firewall, VPN; Simple Network Management Protocol (SNMP), Network policies.

Reference Books:

1. Computer Networks- protocols, standards and Interfaces, Black U., P.H.I.
2. Computer Communication Networks, Stallings W., P.H.I.
3. Computer Networks, Tannembaum A. S., P.H.I
4. Data Communication and Computer Networks : Brijendra singh (PHI)
5. Data Communication and Networking, Behrouz A Forouzan, Tata McGraw-Hill, 2008
6. Data Communication and Computer Networks, Rajneesh Agrawal and Bharat Bhushan Tiwari, Vikas Publishing House Ltd., 2005.
7. Introduction to Data Communications and Networking, Tomasi Wayne, Pearson Education, 2007

Semester - IV

Course Code : CC-09

Course Title : Computer Graphics and Multimedia (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table;



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-2: Devices: storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

Unit-3: Scan conversion Points & lines: Line drawing algorithms; DDA algorithm, Bresenham's line algorithm,

Unit-4: Scan conversion -2: Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Unit-5: 2D transformation Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines.

Unit-6: 2D Viewing: Viewing pipeline, Window to viewport Co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

Unit-7: 3D transformation & viewing 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing.

Unit-8: Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Unit-9: Hidden surfaces Depth comparison: Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry.

Unit-10: Color & shading models: Light & color model; interpolative shading model; Texture;

Unit-11: Graphics Languages: GKS, PHIGS

Unit-12: Multimedia: Introduction to multimedia hardware, Networking, software applications, Environment, CDROM, WORM Optical Drives, Flat panel Displays, Non Temporal Media-Text, Hypertext, Images, Image Operations, CCD Cameras, Scanners, Frame Grabbers, Formats, Audio Digital Audio, Wave Files, Music, MIDI, Graphics Animation-Tweaking, Morphing, Simulating Acceleration, Motion specification, Video-Analog video: Operations, Digital Video, Compression, MPEG, JPEG, Operations, Multimedia Authoring Systems.

Reference Books:

1. D. Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
2. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", Pearson Education, second edition 2003.
3. Procedural Elements of Computer Graphics – D. F. Rogers McGraw Hill
4. Principles of Interactive Graphics – Newman & Sproull McGraw Hill

Semester - III

Course Code : CC-10

Course Title : Theory of Computation (6 Credit)



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Theory: 60 Lectures

Unit-1: Concept of Automation: Definition, concept of sequential circuits, state table & state diagram, concept of synchronous, asynchronous machines.

Unit-2: Finite State Machines: Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM, state equivalence & minimization, machine equivalence, incompletely specified machines, merger graph & compatibility graph, information loss less & inverse machines: testing table & testing graph.

Unit-3: Finite Automata: Preliminaries (strings, alphabets & languages, graphs & trees, set & relations), definition, recognition of a language by an automata - idea of grammar, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Regular Expressions, Equivalence of DFAs, NFAs, and Regular, Expressions, Non-regular languages, Pumping lemma.

Unit-4: Introduction, definition, derivation trees, simplification, Context-Free Grammar (CFG), Parse Trees.

Unit-5: Pushdown Automata: Definition, moves, Instantaneous Descriptions, Deterministic & Non-Deterministic Push Down Automata (PDA), Acceptance by final state & Empty stack, Equivalence of CFGs and PDAs.

Reference Books:

1. Hopcroft JE. and Ullman JD., "Introduction to Automata Theory, Languages & Computation", Narosa.
2. Lewis H. R. and Papadimitrou C. H., "Elements of the theory of Computation", P.H.I.
3. Kain, "Theory of Automata & Formal Language", McGraw Hill.
4. Kohavi ZVI, "Switching & Finite Automata", 2nd Edn., Tata McGraw Hill.
5. P. Linz, An Introduction to Formal Language and Automata 4th edition Publication Jones Bartlett, 2006

Semester - V

Course Code : CC-11

Course Title : Software Engineering (6 Credit)

Theory: 60 Lectures

Unit-1: Software Engineering Fundamentals: Definition of software product, Software Engineering Paradigms; Software engineering, Knowledge engineering, and End user development approaches.

Unit-2: System Analysis: An abstraction, Partitioning and projection, Systems specification, Software Requirements Specification (SRS) standards, Formal Specification methods, Specification tools, Flow based, Data based and Object – Oriented Analysis.

Unit-3: System Documentation: Principles of system documentation, types of documentation and their importance.

Unit-4: System Planning: Data and fact gathering techniques-Interviewing, communications, presentations and site visit. Feasibility study, feasibility reports, prototyping, cost-benefit analysis-tools and techniques.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-5: Systems Design: Idealized and constrained design, Process oriented design (Game and Sarson and Yourdon notations), Data oriented design (Warnier–Orr, E-R modelling), Object oriented design (Booch approach), Cohesion and Coupling, Design matrices, Design documentation standard.

Unit-6: Role of CASE Tools: Relevance of CASE Tools, High-end and Low-end CASE Tools.

Unit-7: Coding and Programming: Choice of programming languages, Mixed language programming and cell semantics, Reengineering legacy systems, Coding standard.

Unit-8: Software Quality and testing: Software quality assurance .Types of Software Testing (White Box and Black Box Testing, Unit Testing, Integration Testing, Verification and Validation of Software) , Debugging and Software Reliability analysis , Software quality and matrices, Software maturity model and extensions.

Unit-9: Software Cost and Time estimation: Functions points, Issues in software cost estimation, Introduction to the Rayleigh curve, Algorithmic cost models (COCOMO, Putnam- Slim, Watson, and Felix), Other approaches to software cost and Size estimation (software complexity, Delphi , costing by analogy).

Unit-10: Software Project Management: Planning software , projects, Work breakdown structures, Integrating software design and project planning ,Software project teams, Projecting monitoring and control.

Reference Books:

1. R S Pressman, Software Engineering; A Practitioner’s Approach (7th Edition), MGH, 2009
2. P Jalote, An Integrated Approach to Software Engineering (2nd Edition), NPH, 2003
3. R. Mall, Fundamentals of Software Engineering (2nd Edition), PHI, 2004

Semester - V

Course Code : CC-12

Course Title : Programming in Java (6 Credit)

Theory: 60 Lectures

Unit-1: Getting Started: Features of Java; Java Magic; Byte Code.

Unit-2: Basics of Java Keywords: Working of Java; Including Comments; Data Types in Java - Primitives Data Types, Abstract / Derived Data Types; Variables in Java; Naming Variables; Using Classes in Java - Standard for Coding; Declaring Methods in Java; Code to Display Test Value; The main Method; Invoking a Method in Java; Saving, Compiling and Executing Java Programs.

Unit-3: Operators and Control Statements: Operators - Arithmetic Operators, Increment and Decrement Operators, Comparison Operators, Logical Operators, Operator Precedence; Control Flow Statements - If-else Statement, Switch Statement, For Loop, While Loop, Do...While Loop, Break Statement, Continue Statement.

Unit-4: Arrays and Strings: The String Constructors, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, String Buffer.

Unit-5: Inheritance, Package and Interface: Inheritance - Types of Relationships, What is Inheritance? Why Generalize? Implementing Inheritance in Java, Access Specifiers, The Abstract



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Class. Packages - Defining a Package, Understanding CLASSPATH; Interface - Defining an Interface, Some Uses of Interfaces, Interfaces versus Abstract Classes.

Unit-6: Exception Handling: Definition of an Exception; Exception Classes; Common Exceptions; Exception Handling Techniques.

Unit-7: Streams in Java: Abstract Streams; Stream Classes; Readers and Writers; Random Access Files; Serialization.

Unit-8: Applets: What are Applets? The Applet Class; The Applet and HTML; Life Cycle of an Applet; The Graphics Class; Painting the Applet; User Interfaces for Applet; Adding Components to user interface; AWT Controls.

Unit-9: Event Handling: Components of an Event; Event Classes; Event Listener; Event-Handling; Adapter Classes; Inner Classes; Anonymous Classes.

Unit-10: JDBC: Database Management; Mechanism for connecting to a back end database; Loading the ODBC driver.

Unit-11: RMI, CORBA and Java Beans: Remote Method Invocation (RMI) – Introduction, RMI Terminology; Common Object Request Broker Architecture (CORBA) – Introduction, What is Java IDL? Example: The Hello Client-Server; Java Beans – Introduction, the BeanBox, Running the BeanBox.

Unit-12: JSP and Servlets: Java Server Pages (JSP) – Introduction, What is needed to write JSP based web application? How does JSP look? How to test a JSP? Servlets – Introduction, History of Web Application, Web Architecture, Servlet Life Cycle.

Unit-13 Swing: Concepts of Swing; Java Foundation Class (JFC); Swing Packages and Classes; Working with Swing- An Example; Swing Components.

Unit-14 Networking: Networking in Java; URL Objects.

Reference Books:

1. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
2. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
3. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition, Printice Hall.2012
4. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
5. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.

Semester - VI

Course Code : CC-13

Course Title : Internet Systems (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction to Internet: Evolution of Internet, concept of Intranet and Internet, Applications of Internet, Types of Connectivity such as dial – up, leased, VSAT. etc., Internet Server and Clients module in various Operating Systems, TCP/IP, Introduction to RFC, Addressing in Internet – IP and Domains, major



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

features of IP, IP datagram, major IP services, IP source routing, value of the transport layer, TCP, major features of TCP, passive and active operation, Internet Service Providers.

Unit-2: E-mail and List-servers: E-mail Networks, E-mail protocols(X.400, SMTP, UUCP), Format of an E-mail message , Description of E-mail Headers, E- mail contents and encoding, E-mail routing, List servers, E-mail clients, POP-3, IMAP-4.

Unit-3: File Transfer Protocol: Introduction to FTP, public domain Software, Types of FTP Servers, FTP clients, Common Commands.

Unit-4: Telnet: Telnet protocol, Server daemon, Telnet clients, Terminal emulation.

Unit-5: Usenet and Internet Relay Chart Introduction to World Wide Web: Evolution of WWW, Basics Features, WWW Browsers, WWW servers, HTTP & URL's.

Unit-6: WWW Browsers: Basic features, Bookmarks, history. Progress indicators, Personalization of Browsers, Printing displayed pages and forms, Saving Web pages, Netscape Communicators, Internet Explorer, Search and Downloads.

Unit-7: Web Publishing: Technology Overview, Web site planning, Where to host your Web site, Multiple sites on one server, Maintaining a Web site, Publishing tools.

Unit-8: HTML: Document overview, Header elements, Section Headings, Block- oriented elements, Lists, Inline elements, Visual Mark-up, Hypertext links, Uniform Resource Locators,(URL's), Images, Forms, Tables, Special characters.

Unit-9: Interactivity Tools: CGI, ActiveX, VB Script and Java Script.

Unit-10: Multimedia and Graphics: VRML.

Unit-11: Search Engines: Technology overview, Popular Search Engines, How to register a Web site on search engines.

Unit-12: Internet Security: Overview of Internet Security threats, Firewalls, Introduction to AAA.

Unit-13: E-commerce: Introduction to E-commerce, Payment Methodology, Security aspects, Standard in electronic payment. E-commerce and Banking, E-commerce and Retailing.

Reference Books:

1. Internetworking with TCP/IP – by D. E. Comer, PHI
2. E-Commerce-Paul A. Murphy, TMH

Semester - VI

Course Code : CC-14

Course Title : Intelligent Systems (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction: What is AI-importance of AI-objectives? Applications of AI in Natural Language Processing, Speech understanding, computer vision, planning etc.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-2: Introduction to LISP: study of features and its application.

Unit-3: Knowledge and AI problem solving concepts: Its representation, organization – manipulation and acquisition, predicate calculus in AI – first order predicate logic & its use in knowledge representation – Resolution principle, use of resolution in reasoning and question answering, production systems and search strategies – production system and its variants – heuristic search methods.

Unit-4: Uncertainty Management: Fuzzy logic, Bayesian inferencing, certainty factor, Structured representation of knowledge – semantic networks, frames, conceptual dependency & scripts.

Unit-5: Learning: Learning automation, learning by induction, neural networks, and genetic algorithms.

Unit-6: Expert systems: Rule based system architecture-non production system architecture-knowledge acquisition methods-explanation methods-expert system shells.

Reference Books:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. N. J. Nilson, Principle of AI, Narosa
3. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991
4. Russell & Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.

Semester – V

Course Code : DSE-01

Course Title : Introduction to Microprocessor and System Software (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction of Microcomputer System: CPU, I/O devices, clock, memory, bussed architecture, tristate logic, address bus, data bus and control bus.

Unit-2: Semiconductor Memories: Development of semiconductor memory, internal structure and decoding, memory read and write timing diagrams, MROM, ROM, EPROM, EEPROM, DRAM.

Unit-3: Architecture of 8-bit Microprocessor: Intel 8085 microprocessor, Pin description and internal architecture.

Unit-4: Operation and Control of Microprocessor: Timing and control unit, op-code fetch machine cycle, memory read/write machine cycles, I/O read/write machine cycles, interrupt acknowledge machine cycle, state transition diagram.

Unit-5: Instruction Set: Addressing modes, Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set, macro RTL and micro RTL flow chart of few typical instructions, unspecified flags and instructions.

Unit-6: Assembly Language Programming: Assembler directives, simple examples; Subroutines, parameter, passing to subroutine.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-7: Interfacing: Interfacing of memory chips, address allocation technique and decoding; Interfacing of I/O devices, LEDs and toggle-switches as examples, memory mapped and isolated I/O structure; Input/output techniques: CPU initiated unconditional and conditional I/O transfer, device initiated interrupt I/O transfer.

Unit-8: Interrupts: Interrupt structure of 8085 microprocessor, processing of vectored and non-vectored interrupts, latency time and response time; Handling multiple interrupts

Unit-9: Programmable Peripheral Interface: Intel 8255, pin configuration, internal structure of a port bit, modes of operation, bit SET/RESET feature, programming, DC and DAC chips and their interfacing.

Unit-10: Programmable Interval Timer: Intel 8253, pin configuration, internal block diagram of counter and modes of operation, counter read methods, programming, READ-BACK command of Intel 8254.

Unit-11: System Programming: Assemblers-Assembler directives, design of two-pass assembler, Microprocessors-Macro definition and expansion, conditional macro expansion, macro defining macros, design of microprocessor (without macro defining macros).

Unit-12: Loader and linker-relocation and linking, dynamic linking and overlaying programs, Compilers-phases in compilation process and operations done in each phase.

Reference Books:

1. Microprocessors: A. P. Mathur
2. Microcomputer systems -8086/8088 family: Liu and Gibson
3. Programming the 80286, 80386 Computers: B. B. Brey
4. Microprocessors and Interfacing: Hall
5. Microprocessor and Interfacing-Programming and Hardware, Hall D. V., 2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008
6. Microprocessor Architecture, Programming and Applications, Gaonkar R. S., 5th Ed., Penram International, 2007.
7. Microprocessor Systems- Hardware, Software and Programming, Stewart J, Prentice Hall International Edition, 1990
8. Microprocessors and Programmed Logic, Short K. L., 2nd Ed., Pearson Education, 2008.

Semester - V

Course Code : DSE-02

Course Title : Data Warehousing and Data Mining (6 Credit)

Theory: 60 Lectures

UNIT-1: Data Warehousing: Introduction- Definition and description, need for data ware housing, need for strategic information, failures of past decision support systems, OLTP vs DWH-DWH requirements-trends in DWH-Application of DWH.

Unit-2: Data Warehousing Architecture: Reference architecture- Components of reference architecture - Data warehouse building blocks, implementation, physical design process and DWH deployment process. A Multidimensional Data, Model Data Warehouse Architecture.

Unit-3: Data Mining: Data mining tasks-Data mining vs KDD- Issues in data mining, Data Mining metrics, Data mining architecture - Data cleaning- Data transformation- Data reduction - Data mining primitives.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-4: Association Rule Mining: Introduction - Mining single dimensional Boolean association rules from transactional databases - Mining multi-dimensional association rules.

Unit-5: Classification and Prediction: Classification Techniques - Issues regarding classification and prediction - decision tree - Bayesian classification –Classifier accuracy – Clustering – Clustering Methods - Outlier analysis.

Unit-6: Applications and Other Data Mining Methods: Distributed and parallel Data Mining Algorithms, Text mining- Web mining.

Books Recommended:

1. Jiawei Han and Micheline Kamber, " Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, USA, 2006.
2. Berson,"DataWarehousing, Data Mining and OLAP", Tata McGraw Hill Ltd, New Delhi, 2004.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, , Pearson Education.
4. Arun K Pujari,"Data mining techniques", Oxford University Press, London, 2003.
5. Dunham M H,"Data mining: Introductory and Advanced Topics". Pearson Education, New Delhi, 2003.
6. Mehmed Kantardzic," Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003.
7. Soman K. P., DiwakarShyam, Ajay V., Insight into Data mining: Theory and Practice, PHI 2006.

Semester - VI

Course Code : DSE-03

Course Title : Cloud Computing (6 Credit)

Theory: 60 Lectures

Unit–1: Introduction- Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

Unit–2: Cloud Services and File System: Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to Map Reduce, GFS, HDFS, Hadoop Framework.

Unit–3: Collaborating With Cloud: Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing, Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis. 185 CS-Engg&Tech-SRM-2013.

Unit–4: Virtualization For Cloud: Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-5: Security, Standards, and Applications: Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Books Recommended:

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz “Cloud Computing” Wiley India Edition, 2010
2. John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and Strategy”, CRC Press, 2010
3. Anthoy T Velte ,Cloud Computing : “A Practical Approach”, McGraw Hill, 2009
4. Michael Miller, Cloud Computing: “Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.
5. James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers, 2006.
6. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010 2.
7. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
8. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
9. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
10. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications , Adobe Reader ebooks available from eBooks.com, 2010
11. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, McGraw Hills, 2010.
12. Dimitris N. Chorafas, Cloud Computing Strategies ,CRC Press, 2010

Semester – VI

Course Code : DSE-04

Course Title : Major Project & Viva-Voce (6 Credit)

Theory: 60 Lectures

PROJECT GUIDLINES

Sl. No.	Topic
I	Message from the Project Coordinator
II	Calendar for the Project
III	Performa for BCA (Hons.) (DSE-04) Project Proposal (Project’s Title and Guide’s Details)
IV	Guidelines for Project Formulation
V	Project Proposal Submission and Approval
VI	Project Report Formulation
VII	Important points while preparing the Project Report
VIII	List of Broad Areas of Application and Related Tools



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

IX	Certificate of Originality
X	Project Trainee Letter

I. MESSAGE FROM THE PROJECT CO-ORDINATOR

The BCA (Hons.) programme prepares the students to take up positions as Programmers, Systems Analysts, Systems Designers in the field related to computer science and information technology, and ITES or students may go for higher studies in this area. We had therefore imparted the comprehensive knowledge covering the skills and core areas of computer science courses with equal emphasis on the theory and practice in BCA (Hons.) programme.

The BCA (Hons.) students are encouraged to involve themselves completely on the project work in their final semester. It is advised to students to develop their project for solving problems of software industry or any research organization. Doing this will give more exposure to handle real life problems of project development.

The courses studied by you during your BCA (Hons.) programme provide you the basic background to work on diverse application domains. The theoretical background of various courses provides you the necessary foundation, principles, and practices to develop effective ways to solve computing problems. The hands on experience gained from the practical courses provide you the knowledge to work with various operating systems, programming languages, and software tools.

This project work is kept in BCA (Hons.) program to give you opportunity to develop quality software solution. During the development of the project you should involve in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, and develops good understanding of SDLC.

Students should take this project work very seriously. DSE-04 project should be taken as an opportunity to develop software, which gives exposure to SDLC. Topics selected, should be complex and large enough to justify as a BCA (Hons.) project. The project should be genuine and original in nature and should not be copied from anywhere else. If found copied, the project report will be forwarded to the Exam Discipline Committee of the University as an Unfair means case for necessary action. Students should strictly follow and adhere to the DSE-04 project guidelines.

I wish you all the success.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

II. CALENDAR FOR THE PROJECT		
Sl. No.	Topic	Date
1	Submission of a Guide's Bio-Data and project proposal to the Head of the Department of the College	1st. October to 31st October
2	Approval of Project	15 days after the project proposal is received.
3	Submission of the Project Report (Two copies) in bound form to the Head of the Department of the College	Latest by 15th May
4	Viva-Voce to be conducted	Date Fixed by the University



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

BANKURA UNIVERSITY
BANKURA, WEST BENGAL – 722 155

III. PROFORMA OF BCA (HONS.) PROJECT PROPOSAL (DSE-04)
(Project's Title and Guide's Details)

UID: Registration No.: College Code:

1. Name and Address of the student

.....
.....
.....

E-mail: Mob. No.

2. Title of the Project

.....

3. Name and Address of the Guide

.....
.....
.....

E-mail: Mob. No.

3. Qualification of the Guide

(Attach Bio-Data also)

Ph.D.	M. Tech.	B. Tech.	MCA	Any other

Note:

- 1. All the above mentioned Degrees must have been awarded in Computer Science/IT only.
- 2. A Guide should not guide more than 8 students of BCA at any point of time)

4. Industrial / Teaching experience of the Guide (in Years)

5. Software Used for this Project:

.....
.....
.....
.....

Note:

- 1. Use of Visual Basic and MS-Access as Front End and Back End respectively is forbidden. But, you are permitted to use Visual Basic with other Software. Also, you can use MS-Access with other software.
- 2. Use of C or C++ Programming Language for Project Related to Database Management is strictly forbidden.

Signature of the Student

Date:

Signature of the Guide

Date:



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

**Important: 1. Attach this Proforma along with Guide's Bio-data and Project Synopsis in the Project Report.
2. Not more than four student is permitted to work on a project.**

For Office Use Only

Approved

Not approved

.....
Signature, Designation, Stamp of the
Project Proposal Evaluator
Date:

Suggestions for reformulating the Project:

Ensure that you include the following while submitting the Project Proposal:

- 1. Proforma for Approval of Project Proposal duly filled and signed by both the student and the Project Guide with date.**
- 2. Bio-data of the project guide with her/his signature and date.**
- 3. Synopsis of the project proposal (12-15 pages).**

A photocopy of the complete Project Proposal (along with Project Proforma, Project Synopsis, Bio-data of the guide) submitted to your Head of the Department, should be retained by the student for future reference.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

**BANKURA UNIVERSITY
BANKURA, WEST BENGAL – 722 155**

IV. GUIDELINES FOR PROJECT FORMULATION

The project work constitutes a major component in most of the professional programmes and it is to be carried out with due care and should be executed with seriousness by the candidates.

TYPE OF PROJECT

As majority of the students are expected to work out a real life project in some industry/research and development laboratories/educational institutions/software companies, it is suggested that the project is to be chosen which should have some direct relevance in day-to-day activities of the candidates in his/her institution. Students are encouraged to work in the areas listed at the end. However, it is not mandatory for a student to work on a real life project. The student can formulate a project problem with the help of Guide.

PROJECT PROPOSAL (SYNOPSIS)

The project proposal should be prepared in consultation with your guide. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. **The project work should compulsorily include the software development.** The project proposal should contain complete details in the following form:

1. Title of the Project
2. Introduction and Objectives of the Project
3. Project Category (RDBMS/OOPS/Networking/Multimedia/Artificial Intelligence/Expert Systems etc.)
4. Analysis (DFDs at least up to second level, ER Diagrams/ Class Diagrams/ Database Design etc. as per the project requirements).
5. A complete structure which includes:
 - Number of modules and their description to provide an estimation of the student's effort on the project.
 - Data Structures as per the project requirements for all the modules.
 - Process Logic of each module.
 - Testing process to be used.
 - Reports generation (Mention tentative content of report)
6. Tools / Platform, Hardware and Software Requirement specifications
7. Are you doing this project for any Industry/Client? Mention Yes/No. If Yes, Mention the Name and Address of the Industry or Client
8. Future scope and further enhancement of the project.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

V. PROJECT PROPOSAL SUBMISSION AND APPROVAL

After finalising the topic and the selection of the guide, students should submit the Project Proposal Proforma given along with the synopsis and bio-data of the guide. Incomplete project proposals in any respect will be summarily rejected.

COMMUNICATION OF APPROVAL:

Communication regarding the Approval / Non-approval of the project will be sent to you within four weeks after the receipt of the project proposal.

RESUBMISSION OF THE PROJECT PROPOSAL IN CASE OF NON-APPROVAL

In case of non-approval, the suggestions for reformulating the project will be communicated to you. The revised project synopsis along with a new Proforma, should be re-submitted along with a copy of the earlier synopsis and non-approval project proposal Proforma in the specific time period. These guidelines are applicable for earlier batch students also whose project work is pending.

ELIGIBILITY OF PROJECT GUIDE

1. A person having Ph. D./M. Tech. in Computer Science.

OR

2. A person having B. E/B. Tech. (Computer Science), MCA, M. Sc. (Computer Science/IT) with minimum 2 years' experience in Industry / Teaching.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

VI. PROJECT REPORT FORMULATION

ITEMS TO BE INCLUDED IN THE PROJECT REPORT

The following items should be included in the Project Report:

1. The project report must contain the following:

- Introduction
- Objectives & scope of the Project
- Theoretical background
- Definition of problem
- Tools/Environment Used
- System planning (PERT Chart)
- Cost and benefit analysis
- Analysis Document (This should include SRS in proper structure based on Software Engineering concepts, E-R diagrams/Class diagrams/any related diagrams (if the former are not applicable), Data flow diagrams/other similar diagrams (if the former is not applicable), Data dictionary)
- Design Document (Modularization details, Data integrity & constraints including database design, Procedural design, User interface design)
- Program code (Complete code (well indented)/Detailed specification instead of code*, Comments & Description. The program code should always be developed in such a way that it includes complete error handling, passing of parameters as required, placement of procedure/function statements as needed.)
- Testing (Test case designs are to be included separately for Unit testing, Integration testing, System testing; Reports of the outcome of Unit testing, Integration testing, System testing are to be included separately. Also, details of debugging and code improvement are to be included.)
- Input and Output Screens
- Implementation of Security for the Software developed (In case, you have set up a User Name and Password for your software, you should ensure the security of User Name and Password during transmission to server)
- Limitations of the Project
- Future Application of the Project
- Brief background of the organization where the student has developed the Project.
- Data dictionary. This should give a catalogue of the data elements used in the system/subsystem developed.
 - ✓ The following are the details required. Write NA if not applicable:
 - ✓ Data name
 - ✓ Aliases, if any
 - ✓ Length (Size)
 - ✓ Type (Numeric, Alpha, binary etc.)
- List of abbreviations, figures, tables
- Reference
 - Bibliography



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

- Website

*Students who have done their project for any organization are permitted to attach detailed algorithm/specification instead of code, in case, the organization doesn't permit them to attach the code. Student needs to attach letter in the project report from the Project Manager of the project in the organization that they are not permitting student to attach the code. In the absence of such letter, the student needs to attach the code compulsorily.

The project report should be hard bound; should consist of a **Contents** page; all pages of report should be numbered; content should be well organized in a meaningful manner; printouts of text & screen layouts should be original and should not be Xeroxed)

2. Original copy of the Approved Project Proposal Proforma, Synopsis and Guide's Bio-data.

3. Certificate of Originality.

4. The Project Report may be about 50 to 80 double spaced A-4 size typed pages (excluding program code). However, 10% variation on either side is permissible.

5. Soft Copy of the Project on CD/DVD

SUBMISSION OF PROJECT REPORT

Only two copy of the project report is to be submitted to the Head of the Department of the College by the date mentioned in the Calendar for the project.

TYPE OF PROJECT

The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories / Educational Institution / Software Company. Students are encouraged to work in the areas listed at the end (Refer page no.15). However, it is **not mandatory** for a student to work on a real-life project. The student can formulate a project problem with the help of her/his Guide and submit the project proposal of the same. If approved, the student can commence working on it and complete it.

PROJECT EVALUATION

The **Project Report** is evaluated for 50 marks and the **Viva-Voce** is for 30 marks. To be declared successful, the student should secure at least 40% marks in both project report evaluation and viva-voce. Students will be duly intimated about the schedule of viva-voce by a letter from the respective College. An unsuccessful student can either submit the same project after following comments on the assessment sheet or s/he can do a different project. Always, ensure that the DSE-04 project guidelines are followed.

Unfair cases of copied versions of the project synopsis and project reports will be sent to Unfair Means Committee of Bankura University for action.

RESUBMISSION OF THE BCA (Hons.) PROJECT IN CASE OF FAILED STUDENTS

If the student is unsuccessful in the project, s/he should „re-do“ the whole cycle, right from the submission of the project synopsis. Students are advised to select a new topic for the project and should prepare and submit the project synopsis to the Regional Centre concerned as per the project guidelines. There are no separate slots for the submission of the project synopsis / project reports for the failed students.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Respective submissions of the project synopsis and the project reports should be done strictly as per the "Calendar for the BCA project" given in the project guidelines.

ENQUIRIES

Enquiries regarding the Project Report and Viva-Voce should be addressed to the **Head of the Department of the College.**

VII. IMPORTANT POINTS WHILE PREPARING THE PROJECT REPORT

1. The Project Report should be submitted in A-4 size typed in double space. The Project Report should be hard bound.
2. Ensure that it contains the following:
 - Project Proposal Proforma. All the items should be filled. The signatures of both student and Guide should be present.
 - Project Synopsis. Both Guide and student should sign on the Project Synopsis.
 - Guide's Bio data. The Bio-Data should consist of signature of the Guide. Certificate of Originality
 - All signatures should be accompanied by the date of signature.
3. **If any project report is received in the absence of the items listed above, it will be rejected and returned to students for compliance. Also, violation of Project Guidelines may lead to rejection of the Project.**
4. **Two hard bound original copy of the project report is to be submitted to the head of the dept. of the respective college. One copy of the same Project Report is to be retained with the student and the student is supposed to carry his copy while appearing for viva voce. Spiral binding of Project Report is not permitted.**
5. Xerox copy of the project report is not acceptable.
6. Not more than one student is permitted to work on a Project.
7. If the title of the Project differs from the title mentioned in the Project Proposal, the Project Report will be rejected and will be returned back to the student.

VIII. LIST OF BROAD AREAS OF APPLICATION AND RELATED TOOLS

FRONT END / GUI Tools	Visual Basic, Power Builder, X-Windows (X/lib, X/motif, X/Intrinsic), Oracle Developer 2000, VC++, Jbuilder
RDBMS/BACK END	Oracle, Ingres, Sybase, Progress, SQL Plus, Versant, MY SQL, SQL Server, DB2
LANGUAGES	C, C++, Java, VC++, C#
SCRIPTING LANGUAGES	PERL, SHELL Scripts(Unix), Tcl/TK
MIDDLE WARE (COMPONENT) TECHNOLOGIES	COM/DCOM, Active-X, EJB, Rational Rose, MSMQ, BEA, Message Q, MTS, CICS



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

UNIX INTERNALS	Device Drivers, Pipes, RPC, Threads, Sockets
ARCHITECTURAL CONCEPTS	CORBA, TUXEDO
INTERNET TECHNOLOGIES	DHTML, Java script, VB Script, Perl & CGI script, HTML, Java, Active X, RMI, CORBA, SWING, JSP, ASP, XML, EJB, Java Beans, Java Servlets, Visual Age for JAVA, UML, VRML, WML, iPlanet, ATG, BigTalk, CSS, XSL, Oracle ASP server, VB.Net, AWT, J2EE, LDAP, ColdFusion
NETWORKING TECHNOLOGIES	ATM, Frame Relay, TCP/IP, SNMP, GSM, VoIP, PPP, IP-PSTN, SONET/SDH
WIRELESS TECHNOLOGIES	Blue tooth, Wi-Fi, 3G, 4G, ISDN, EDGE
REALTIME OPERATING SYSTEM / EMBEDDED SKILLS	QNX, LINUX, OSEK, DSP, VRTX, RTXC, Nucleus
OPERATING SYSTEMS	WINDOWS 7/8/10, WINDOWS NT, UNIX, LINUX, IRIX, SUN SOLARIS, HP/UX, PSOS, VxWorks, AS400, AIX, DOS
APPLICATIONS	Financial/ Manufacturing/ Multimedia/ Computer Graphics/ Instructional Design/ Database Management System/ Internet/ Intranet/ Computer Networking Communication Software/E-Commerce/ ERP / MRP/ TCP/IP Internals/ Routing protocols/ Socket Programming/ Implementation of Switches & Routers
<p>Note: <i>Projects should not be developed using the packages like Dbase, Foxpro, Visual Foxpro . Also, projects should not be developed using the combination of Visual Basic as the front end and MS-Access as the back end.</i></p>	



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

IX. CERTIFICATE OF ORIGINALITY

This is to certify that the project report entitled _____

Submitted to **Bankura University** in partial fulfilment of the requirement for the award of the degree of **BACHELOR OF COMPUTER APPLICATIONS (Hons.)**, is an original work carried out by Mr./

Ms. _____ UID: _____

and Registration No. _____ under the guidance of Mr./

Ms. _____

The matter embodied in this project is a genuine work done by the student and has not been submitted whether to this University or to any other University / Institute for the fulfilment of the requirement of any course of study.

Signature of the Student

Date

UID:

Reg. No.

Signature of the Guide

Date

Name

Designation



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

X. PROJECT TRAINEE LETTER

Date:

Subject: Project Trainee

Sir,

This is to certify that Mr / Ms _____ whose UID _____ and Registration No. _____ is a student of BCA (Hons.) Course Bankura University and has to do a project in his/her final semester starting from January / July session. The project is compulsory for BCA (Hons.) course. S/he has to do a project for 3-4 months in Industry/Research Laboratories under the supervision of a guide preferably from the same organization. During his course, the student has gone through / will go through several theoretical papers such as Data Structures, Database Management System, Programming Languages (C, C++, and Java), TCP/IP Programming, Intranet Administration, Computer Networks, and Software Engineering etc. The student also attended / will also attend practical sessions in all courses in which practical sessions were prescribed for various subjects.

Looking forward for your positive response.

**Signature & Name of Project Coordinator
with Date and Stamp**

Note: This letter may also be signed by Head of the Department / Principal /TIC of the College



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Semester - I

Course Code : GE-01

Course Title : Mathematics-I (6 Credit)

Theory: 60 Lectures

Unit-1: Algebra: Sets, Union and Intersection, Complement, Mapping, Composition, notion of a Group, Ring, Field with simple examples.

Unit-2: Complex Number: Modulus and amplitude, De Moivre's theorem

Unit-3: Polynomials, Division algorithm, Fundamental theorem of classical algebra (Proof not required), Descartes rule of sign and their application, Relation between roots and coefficients; symmetric function of roots, Transformation of polynomial equation, Cardon's solution of cubic equation, Determinants, Addition and Multiplication of Matrices, Inverse of a Matrix ; Solution of linear equations in three variables by Cramer's rule and solution of three line linear equations by matrix inversion methods.

Unit-4: Vector spaces, Subspaces, Bases and Dimensions, Co-ordinates, Linear Transformation, The Algebra of Linear Transformations.

Unit-5: Vector Algebra: Scalars & vectors, vector addition, linear combination of vectors, condition of colinearity of three points, scalar and vector products, scalar triple product and vector triple product.

Unit-6: Analytical Geometry: Translation and rotation of rectangular axes, invariants, general equation of second degree-reduction to standard forms and classification. Plane polar equation of a straight line, circle, ellipse, parabola and hyperbola.

Reference Books:

1. A Text book of Algebra- B.K. Lahiri & K. C. Roy
2. Linear Algebra- Das & Roy
3. Co-ordinate Geometry- S. L. Loney
4. Differential Calculus- Das and Mukherjee
5. Integral Calculus - Das and Mukherjee

Semester - II

Course Code : GE-02

Course Title : Principals of Accounting and Costing (6 Credit)

Theory: 60 Lectures

Unit-1: Introduction of Accounting: Introduction, Basic Accounting concepts and Conventions, Double Entry Accounting, The Accounting Trail, Financial Statement and their Nature, The Accounting Equation.

Unit -2: Primary Books- Introduction, Golden Rules, cash Book, Secondary Books- posting techniques in the ledger, Trial Balance and Final Account, Trading A/c, Profit and Loss A/c and Balance Sheet- Preparation of Trial Balance and Final Account



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit -3 Working Capital Management: Meaning, Classification, Importance, Working Capital Cycle, Factors determining Working Capital, Different Sources of Working Capital, Management of Working Capital and Importance, Estimation of Working Capital, Inventory Management- EOQ

Unit -4: Financial Statement Analysis: Meaning of Ratio Analysis, Balance sheet Ratio, Profit and Loss Account Ratio, Combined Ratio, Advantages and Limitations of ratio Analysis and computation of ratios, Meaning of Fund Flow Statement, Objectives of Fund flow Statement, Meaning of Cash Flow Statement, Objectives of Cash flow Statement, Uses of Cash Flow Statement, Difference between Cash Flow and Fund Flow statement.

Unit-5: Understanding Cost: Introduction, Classification of Cost (on the basis of behavior and on the basis of element), Overhead and non-cost items, Classification of Overhead, Determination of Total Cost, Cost Sheet, Preparation of Cost Sheet, Necessity of preparation of cost Sheet

Unit-6: Marginal Costing and Break-even Analysis: Introduction, Meaning and Features of Marginal Costing, Limitations, Profit Volume Ratio, Contribution, Break- even Point, Margin of Safety, Simple Problems on Marginal Costing.

Unit- 7: Budgetary control: Introduction, Meaning of Budget, Objectives of Budgetary Control, Steps in Budgetary Control, Types of Budget, Limitations of Budgetary Control

Reference Books:

1. Accounting for managers – Asish K. Bhattacharya; PHI.
2. Financial accounting for management – N Ramachandran & am Kr. Kakni; Tata McGraw-Hill.
3. Modern Accountancy-Amitabha Mukherjee & Mohammed Hanif; Tata McGraw-Hill.
4. Financial Accounting – Ashok Banerjee; Excel Books.
5. Introduction to Financial Accounting – Horngren; Pearson Books.
6. Accounting & Finance for Managers – T.P. Ghosh; Taxmann.
7. Financial Management – I.M. Pandey; Vikas Publishing House.
8. Financial Management – Khan & Jain; Tata McGraw Hill.
9. Fundamentals of Financial Management – Chandra Bose; PHI.

Semester - III

Course Code : GE-03

Course Title : Mathematics-II (6 Credit)

Theory: 60 Lectures

Unit-1: Differential Calculus: Limit of a function and continuity. Fundamental properties of continuous functions (proofs not required); Derivative and Differential-Geometric meaning, Rules of Differentiation. Successive differentiation.

Unit-2: Rolle's theorem, Mean-Value theorems, Taylor's and Maclaurin's theorems with Cauchy's and Lagrange's forms of remainder; Taylor's series. Functions of several variables. Partial Derivatives. Total Differential. Euler's theorem on homogeneous functions of two variables. Application to plane curves.

Unit-3: Integral Calculus: Rules of Integration of Indefinite Integrals, Solution of Definite Integrals and their elementary properties. Idea of improper integrals.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-4: Differential Equations: order, degree, solution and formation of a differential equation. Standard techniques of solving a linear differential equation with constant coefficients. Cauchy's and Legendre's Linear Differential Equations with variable coefficients.

Unit-5: Sequence and Series: Bounded and unbounded sequences, Convergence or divergence of a sequence, Behavior of monotone sequences, Algebra of convergent sequences, Cauchy sequence, Cauchy's general principle of convergence, Infinite series, its convergence and sum, series with positive terms and standard tests of convergence (without proofs), Alternating Series, Leibniz Test, Absolute convergence, Rearrangement of absolutely convergent series, Test of convergence of Abel and Dirichlet (without proofs)

Reference Books:

1. Differential Equations - Shepley I. (John Wiley & Sons, Inc)
2. Linear Algebra - Kenneth Hoffman & Ray Kunze (PHI)
3. Mathematical Analysis - S. C. Malic (Wiley Eastern Limited)
4. Differential Calculus – Das and Mukherjee
5. Integral Calculus – Das and Mukherjee

Semester - IV

Course Code : GE-04

Course Title : Mathematics-III (6 Credit)

Theory: 60 Lectures

Unit-1: Probability and Statistics: Permutation and Combinations, Probability, Classical definition of probability. Conditional probability. Statistical independence of events. Random variable and its expectation and variance, joint dispersion of attributes.

Unit-2: Collection and presentation of data, Frequency distribution, Measures of central tendency, Measures of dispersion, Binomial, Poisson and Normal distribution.

Unit-3: Bivariate Frequency Distributions (scatter Diagram, Correlation coefficient and its properties, regression lines, correlation index and correlation ratio, rank correlation).

Unit-4: Multiple linear regression, multiple correlation, partial correlation (for 3 variables only).

Unit-5: Random sampling, expectations and standard error of sampling mean. Expectation and standard error of sampling proportions.

Unit-6: Test of significance based on t, F, and CHI square distribution.

Unit-7: Numerical Methods and Algorithms Solution of non-linear equations: Bisection, Newton-Raphson, Regular-Falsi and Secant method. Interpolation and approximation- Lagrange Interpolation, Newton's Forward Interpolation and Newton's backward Interpolation methods.

Unit-8: Integration: Trapezoidal and Simpson's 1/3 rules.

Unit-9: Solution of linear equations: Gaussian elimination, Gauss Seidel method.

Unit-10: Solution of differential equations; Euler's, Taylor's series, Runge-kutta (order-2)



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Reference Books:

1. C Language and Numerical Methods C Xaviers, New Age International
2. Fundamentals of Statistics – Goon, Gupta, DasGupta
3. Statistical Methods (vol 1 and 2) – N.G. Das.
4. Mathematical and Statistics – Ajay Goel and Alka Goel; Taxmann.
5. Statistics – Sancheti and Kapoor; Sultan Chand & Sons.

Semester - III

Course Code : SEC-01

Course Title : Android Programming (2 Credit)

Theory: 60 Lectures

Unit-1: Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

Unit-2: Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

Unit-3: Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device.

Unit-4: User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

Unit-5: User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, and Dialog.

Unit-6: Database: Understanding of SQLite database, connecting with the database.

Reference Books:

1. Android application development for java programmers. By James C. Sheusi.
2. Publisher: Cengage Learning, 2013.
3. Android Developer Tools Essentials by Mike Wolfson - O'Reilly Media Publications
4. Learn Java for Android Development, 2nd Edition - Jeff Friesen - Apress Publications
5. OpenGL ES 2 for Android - Kevin Brothaler- The Pragmatic Programmers
6. Android Application Development (With Kitkat Support), Black Book by Pradeep Kothari, Kogent Learning Solutions Inc.

Semester - III

Course Code : SEC-01

Course Title : Web Programming (2 Credit)

Theory: 60 Lectures

Unit-1: HTML Basics: HTML Introduction, HTML Elements, Attributes, HTML Headings, Paragraphs, HTML Formatting, Fonts, Styles, HTML Links, Images, Tables, HTML Lists, Forms, Frames, HTML Colors, Colornames, Colorvalues, HTML Quick List.

Unit-2: XML Programming–I: Introduction, The Need for XML, Structured Data and Formatting, Advantages of XML, SGML, XML, and HTML, World Wide Web Consortium (W3C) Specifications and



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Grammars, XML Applications and Tools, Creating and Viewing XML Documents, Transforming XML Documents, XML Document Syntax, Validating XML Documents with DTDs, XML Namespaces.

Unit-3: XML Programming–II: Introduction, Transforming XML Documents with XSLT and XPath, Formatting XML Documents with XSL-FO, Purpose of XSL Formatting Objects (XSL-FO), XSL-FO Documents and XSL-FO Processors, XSL-FO Namespace, Page Format Specifiers, Page Content Specifiers.

Unit-4: XML Programming–III: Validating XML Documents with Schemas, Introduction to Simple Object Access Protocol (SOAP), SOAP's Use of XML and Schemas, Elements of a SOAP Message, Sending and Receiving SOAP Messages (SOAP Clients and Receivers), Handling SOAP Faults, Current SOAP Implementations, Introduction to Web Services: Architecture and Advantages of Web Services, Purpose of Web Services Description Language (WSDL), WSDL Elements, Creating and Examining WSDL Files, Overview of Universal Description, Discovery, and Integration (UDDI), UDDI Registries (Public and Private), Core UDDI Elements, Deploying and Consuming Web Services, ebXML Specifications ebXML Registry and Repository, Introduction to the XML Document Object Model (XMLDOM)

Unit-5: XML applications: B2B Scenarios, e-business system involved: delivery, sales, cross company communication: replacement for EDI, the document as the application, XML and relational databases, XML and dynamic Web publishing, benefits of XML schemas to applications, XML processors enforcing structure, application access to document structure, fixed values, and channels.

Unit-6: Ajax - Asynchronous JavaScript and XML – Overview: Web Applications - Pre and Post Ajax, Ajax in the Real World, Alternatives to Ajax, XML In A Nutshell, Syntax, Rules, JavaScript In A Nutshell, Primitive Data Types and Reference Types, Variables Loops, Function Definition and Function Call, Objects, Expressions, Operators and Escape Sequences, Document Object Model (DOM), Window Object, HTML & XML DOM, Node, Element, Accessing Element Nodes, Inner HTML, Properties of Element and Text Nodes, Node Attributes Node Name & Node Value, Event Handling, Key Word – this, Whitespace, Interpretation - Browser Differences, Removing Nodes, Creating New Nodes, Node Methods.

Unit-7: Ajax-XML Http Request Object: XML Http Request Instantiation, XML Http Request open() Method, Asynchronous Vs Synchronous Requests, Callback Function, ready State, CSS In A Nutshell, Syntax, Units, Selectors, Positioning properties, float Property, Types of Positioning 3D, XML and Ajax, Creating a DOM Document with JavaScript, load XML, Receiving XML Responses from the Server, Passing XML to the Server 90, Different Server Side Technologies - an overview, Frameworks and Toolkits - an overview, Some Popular Frame Works - in brief

Unit-8: AJAX-Object-Oriented JavaScript: Multiple Simultaneous Asynchronous Requests, Prototype, Extending Built-in Objects, Object-Oriented XML Http Request, Refactoring the Creation and Handling of XHR Http Request, Model-View-Control (MVC), Design Patterns, MVC Examples, Ajax Web Application, JavaScript Object Notation (JSON), JavaScript Object and Array Creation Using Literals, JavaScript Objects in Arrays & Arrays in Objects, JSON Syntax, JSON Parsers, JSON Data Transfer Between Client and Server Autosuggest example

Unit-9: AJAX-XSLT: XSLT, Overview, XSLT in the Browsers, Sarissa, Advantages and Disadvantages, XPath – Overview, Drag and Drop, Overview, Scriptaculous, Draggable Options, Droppables, Drag and Drop, Ajax and Scriptaculous, Appendix, Download / Install Software –Wamp, Regular,



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

xpressions, Some characteristics of regular expressions Metacharacters, Non-assertions and Quantifiers, Assertions and Quantifiers, XML Basics, XML Benefits, XML Parsers, Content Management, Web Services, A Document Type Declaration, Elements Attributes, CDATA, Special Characters

Unit-10: J2ME: Java Environments Comparison, J2ME (Java 2 Micro Edition), J2SE (Java 2 Standard Edition) & J2EE (Java 2 Enterprise Edition), J2ME specifics, ME components: KVM, J2ME, CLDC, MIDP - Comparison of different ME platforms, Profiles - Overview of profile system, Architecture - How the J2ME works, Differences between J2ME environments - Comparisons between J2ME and Personal Java, MIDP, Mobile information device profile, Creating MIDP applications, Midlet suites and deployment, MIDP GUI, Graphical User Interfaces with MIDP, Displays, Commands, Pointers, Screens, Animations and drawing, Data structures: Storing data in Java, Hash table and Hash Map, Vector and List, Comparison between different types, Inner classes, Using inner classes, Types of inner classes, Anonymous, Inner, Member, Static, Exceptions, IO and Networking, Error handling, Streamed IO, Socket IO (TCP/IP), J2ME, IO, Connector architecture, Networking with HTTP, Threading, Creating threads in Java, Synchronization

Unit-11: Introduction to HTML5: HTML5 - New standard for HTML, XHTML, and the HTML DOM, How Did HTML5 Get Started? Rules for HTML5, New Features, Some of the most interesting new features in HTML5, Browser Support, New Elements in HTML5, New Markup Elements, New Media Elements, The Canvas Element, New Form Elements, New Input Type Attribute Values, Video on the Web, Video Formats, How It Works, All <video> Attributes

Unit-12: HTML5 – Audio and Canvas: Audio on the Web, Audio Formats, How It Works, All <audio> Attributes, HTML5 Canvas, What is Canvas? Create a Canvas Element, Draw With JavaScript, Understanding Coordinates, More Canvas Examples, HTML5 Web Storage, Storing Data on the Client, The localStorage Object, The sessionStorage Object, HTML5 Input Types, HTML5 New Input Types, Browser Support, Input Type – email, Input Type – url, Input Type – number, Input Type – range, Input Type - Date Pickers, Input Type – search, Input Type – color

Unit-13: HTML5 Form Elements and Attribute: HTML5 New Form Elements, Browser Support, datalist Element, keygen Element, output Element, HTML5 Form Attributes, HTML5 New Form Attributes, Browser Support, autocomplete Attribute, autofocus Attribute, form Attribute, Form Override Attributes, height and width Attributes, st Attribute, min, max and step Attributes, multiple Attribute, novalidate Attribute, pattern Attribute, placeholder Attribute, required Attribute: HTML5 Tag Reference, HTML5 Global Attributes, HTML5 Event Attributes, Global Event Attributes, Window Event Attributes, Form Events, Keyboard Events, Mouse Events, Media Events

Unit-14: WAP Simulator for Mobile Phones: Introduction, WAP toolkit software includes: WML and WML Script encoders, phone simulators, WML Deck and Card, WML Document Structure, Character data, WML Entities, Prolog, XML Declaration and Character Encoding, Comments in WML, Line Breaking in WML, Paragraphs and Line Breaks, Text Formatting, WML Tables, Wireless Bitmap (WBMP), Links, <anchor> tag, <a> tag.

Reference Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml, javascript, Perl Cgi , BPB Publications, 2009.
2. Jim Keogh, The Complete Reference J2EE, TMH, , 2002.
3. O'Reilly, Java Server Pages, Hans Bergsten, Third Edition, 2003.
4. Chris Bates, Web Programming, Wiley



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

5. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book, Kogent Learning Solutions Inc
6. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2 Ed., DT Editorial Services.

Semester - IV

Course Code : SEC-02

Course Title : Wireless Mobile Communication (2 Credit)

Theory: 60 Lectures

Unit-1: Introduction to mobile communication and computing: The application and significance of mobile communications, mobile and wireless devices along with the history of wireless communication, simple Reference Model of communication.

Unit-2: Wireless Transmission – I: various frequencies used for communication, types of signals and the antennas used for communication, methods of signal propagation and the techniques of multiplexing, learn how signals are propagated using various modulation techniques - analog modulation and digital modulation, spread Spectrum technology like Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS), cellular systems used for mobile communications along with the way frequency and planned.

Unit-3: Wireless Medium Access Control: reasoning of need for a Specialized MAC in wireless domain, various medium accessing technique viz. Space Division Multiple Access (SDMA), Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA).

Unit-4: Wireless Telecommunication Systems: Global systems used for Mobile (GSM) Communications, architecture of a GSM system and GSM –TDMA/ FDMA frame and various types of logical channels in GSM system and the use of GSM hierarchy of frames GSM protocol layers for signaling, High Speed Circuit Switched Data (HSCSD) and General Packet Radio Service (GPRS).

Unit-5: Universal Mobile Telecommunication System (UMTS): Universal Mobile Telecommunication System (UMTS) where UMTS system architecture and UMTS radio interface, UTRA Network (UTRAN).

Unit-6: Wireless LANs: Various mobile communication technologies according to IEEE, characteristics of wireless LANs and the comparison of infrared and radio transmission technologies, infrastructure-based wireless networks along with the Ad hoc wireless networks. Architecture of an infrastructure based IEEE 802.11 and architecture of IEEE 802.11 ad hoc network, various IEEE standards of 802.11.

Unit-7: Mobile Network Layer: Mobile IP technology, goals, assumptions and requirements of Mobile IP, techniques and various entities and terminologies of mobile IP. Dynamic Host Configuration Protocol (DHCP).

Unit-8: Mobile Transport Layer: Traditional TCP protocol and the need of modifying this protocol in wireless domain, how the classical TCP is improved into Indirect TCP, Snooping TCP and Mobile TCP, other methods of improving the TCP for wireless domain, Fast retransmit/fast recovery, Transmission/ time-out freezing, Selective retransmission and Transaction oriented TCP as the improvements for TCP in wireless domain, TCP Over 2.5/3G wireless networks.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-9: Data Processing and Mobility: Effect of mobility of the mobile nodes and the way data are categorized and managed when the nodes are mobile, way transactions are managed in Mobile Database Systems. Various execution models for mobile database system.

Unit-10: Mobile Ad hoc Networks: Mobile Ad hoc Networks (MANETs), properties of a MANET and the spectrum of MANET applications. Various routing algorithms used in MANETs, security aspects in MANETs.

Unit-11: 4G Technology: 4G technology and its various flavors, WiMAX (Worldwide Interoperability for Microwave Access), LTE (Long Term Evolution) and HSPA+ (High Speed Packet Access) technology.

Unit-12: HTML5 on Mobile Devices: HTML5 technology required for mobile websites and mobile applications on mobile operating systems, tools of HTML5 which are very relevant for developing the web applications for the mobile devices.

Reference Books:

1. Upena Dalal, Manoj K. Shukla, Wireless and Mobile Communication, Oxford Higher Education
2. Upena Dalal, Wireless Communication and Networks, Oxford Higher Education
3. JOCHEN H SCHILLER, MOBILE COMMUNICATIONS, 2ED, Pearson
4. Sanjay Sharma, Wireless Communication, S. K. Kataria & Sons
5. Rappaport , Wireless Communications: Principles and Practice, 2e, Pearson

Semester - IV

Course Code : SEC-02

Course Title : Database Programming with PL/SQL (2 Credit)

Theory: 60 Lectures

Unit-1: Introduction to PL/SQL: History, Benefits, Creating PL/SQL Blocks

Unit-2: Variables and Data types: Defining Variables and Data types, Variables in PL/SQL, Recognizing PL/SQL Lexical Units, Recognizing Data Types, Scalar Data Types, Writing PL/SQL Executable Statements, Nested Blocks and Variable Scope, Composite Data types: User-Defined Records, Indexing Tables of Records.

Unit-3: SQL in PL/SQL: Review of SQL DML, Retrieving Data in PL/SQL, Manipulating Data in PL/SQL, Transaction Control Statements.

Unit-4: Program Structures: Conditional Control: IF Statements, Conditional Control: CASE Statements, Iterative Control: Basic Loops, Iterative Control: WHILE and FOR Loops, Iterative Control: Nested Loops.

Unit-6: Cursors and Parameters: Introduction to Explicit Cursors, Explicit Cursor Attributes, Cursor FOR Loops, Cursors with Parameters, Cursors for UPDATE, Multiple Cursors.

Unit-7: Exception Handling: Handling Exceptions, Trapping Oracle Server Exceptions, Trapping User-Defined Exceptions, Recognizing the Scope of Exceptions.



BANKURA UNIVERSITY

CBCS Syllabus for BCA (Hons.)

Unit-8: Procedures: Creating Procedures, Parameters in Procedures, Passing Parameters.

Unit-9: Functions: Creating Functions, Functions in SQL Statements, Review of the Data Dictionary, Managing Procedures and Functions, Review of Object Privileges, Invoker's Rights and Autonomous Transactions.

Unit-10: Packages: Creating Packages, Managing Package Concepts, Advanced Package Concepts, Persistent State of Package Variables, Oracle-Supplied Packages.

Unit-11: Triggers: Introduction, Creating DML Triggers, Creating DDL and Database Event Triggers, Managing Triggers.

Unit-12: Dependencies: Introduction to Dependencies, Understanding Remote Dependencies.

Unit-13: PL/SQL Compiler: PL/SQL Initialization Parameters, Displaying Compiler Warning Messages, Conditional Compilation, Hiding Your Source Code.

Reference Books:

1. Michael McLaughlin, Oracle Database 12c PL/SQL Programming, McGraw Hill.
2. Bayross Ivan, SQL, PL/SQL the Programming Language of Oracle, SCHAND
3. Groff James, SQL The Complete Reference, 3rd Edition, McGraw Hill
4. Feuerstein, Steven (,Oracle PL/SQL Programming Paperback, O'REILLY

===== **XXX** =====