DEPARTMENT OF COMPUTER SCEINCE

OLD SYLLABUS

GPO, PSO, CO

GRADUATE PROGRAMME OUTCOMES (GPO)

At the completion of the B.Sc. Computer Science Degree Programme, the student will be able to accomplish the following outcomes.

GPO No.	Graduate Programme Outcomes (GPO)
GPO.1	**Critical Thinking**: Take An Informed And Analytical Approach To Learning and Demonstrate In-Depth Knowledge Of The Subject And Give Opinion(S)Supported By Logical Reasoning That One Have Judged To Be Appropriate And Understanding Different Approaches And Using Them
GPO.2	**Effective Communication:** Demonstrate Proficiency In Communicating competently In Groups And Organizations, Competence In Interpersonal communication; Possess Skills To Effectively Deliver Formal And Informal Presentations To A Variety Of Audiences In Multiple Contexts
GPO.3	**Social Interaction:** Foster Social Skills And Peer Interaction Enabling them To Make All People Feel Valued And Respect Their Differences By Being Responsible Citizens For Creating A Socially Inclusive Society
GPO.4	**Ethical Standards:** Recognize Values Such As Justice, Trust, Equity, Fairness, Kindness And Develop A Commitment To Meeting And Upholding Standards Of Ethical Behaviour In All Walks Of Life And Comprehending The Moral Dimensions Of Decisions And Actions
GPO.5	**Environmental Consciousness:** Discern The Issues Of Environmental Contexts And Engages In Promoting Values And Attitudes That Claim Coexistence And Sustainable Living With Reduced, Minimal, Or No Harm Upon Ecosystems
GPO.6	**Lifelong Learning:** Acquire The Skill To Be An Independent Lifelong Learner Embracing Real-Time Changes In The Socio-Technological Context, Promoting Continuous Development And Improvement Of The Knowledge And Skills Needed For Employment And Personal Fulfilment

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO NO	Programme Specific Outcomes (PSO)	GPO
PSO1	Design, Implement, Test And Evaluate A Computer System, Component Or Algorithm To Meet Desired Needs And To Solve A Computational Problem.	1,2,6
PSO2	Create And Understand Different Programming Languages, Basic Theory And Summarise Different recent Technologies.	1,2,6
PSO3	Understand The Principles And Working Of Computer System (Hardware And Software Aspects Of Computer)	1,2,6
PSO4	Analyse And Execute Different Professional And Discipline Aspects.	1,2,3,5
PSO5	Execute Knowledge Of Probability And Statistics Including Application Appropriate To Computer Science	1,6
PSO6	Analyse The Structure Of English Phonetics And Grammar And Also Improve Communication Skills. Improve The Skills Of Food Science And Commercial Aspects Also.	1,2,3,4,6

SEMESTER-I

COURSE	DETAILS
CODE	BCS103
TITLE	BASIC ELECTRONICS AND COMPUTER FUNDAMENTALS
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/I
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand Introduction to Computer and Booting Process	U	PSO1
2	explain Introduction to Computer Hardware	U	PSO1
3	Understand Expansion Slots	U	PSO1
4	Explain about Input Devices, Data Scanning Devices, Voice Recognition Device, Output Devices	U	PSO1
5	Explain Memory, Secondary memory ,PC memory Units	U	PSO1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Introduction to Computer**	**20**	1
1.1	Generations of Computer (I-V)	3	1
1.2	Classification of Computers: Analog, Digital and Hybrid Computers	3	1
1.3	Micro, Mini, Mainframe, Super Computers, Servers, Laptop	3	1
1.4	Block Diagram of a Computer	3	1
1.5	Functions of the Different Units: Input unit, Output unit, Memory unit, CPU (ALU+CU).	3	1
1.6	Booting Process- POST, BIOS, clock speed, memory speed, memory capacity.	5	1
2.0	**Introduction to Computer Hardware**	**15**	2
2.1	DC regulated power supply- Block Diagram	3	2
2.2	Concepts of Switch Mode Power supply	3	2
2.3	Inverters, UPS and their applications	3	2
2.4	Basic Components of CPU	3	2
2.5	Mother Board.	3	2
3.0	Expansion Slots	10	3
3.1	ISA, EISA, MCA, VESA, PCI local bus	3	3
3.2	Processor, Connectors, CMOS memory	3	3
3.3	SMPS, Serial and Parallel Ports, USB BIOS chip	3	3
3.4	Steps for assembling a PC	1	3
4.0	**Input Devices, Data Scanning Devices, Voice Recognition Device Output Devices**	**15**	4

4.1	Keyboard, Point and draw devices	2	4
4.2	mouse, joystick, track ball, light pen	2	4
4.3	image scanner, OCR, OMR, MICR, Bar code reader	3	4
4.4	Microphone	3	4
4.5	Monitor- CRT displays, Non-CRT displays, TFT: LED, LCD, Plasma	3	4
4.6	Printer, Impact and non-impact, Character, line and Page Printers	2	4
5.0	**Memory, Secondary memory, PC memory Units**	**15**	**5**
5.1	Primary Memory, RAM- SRAM, DRAM, ROM, PROM, EPROM, EEPROM, flash memory	3	5
5.2	Hard Disk: Structure of a hard disk, how data is stored in a hard disk	3	5
5.3	concept of tracks, sectors, clusters, cylinders	3	5
5.4	CD-R, RW, DVD-RW, Blue-ray disk, HVD	3	5
5.5	SIMM, DIMM, RIMM	2	5

COURSE	DETAILS
CODE	BCS104
TITLE	METHODOLOGY OF PROGRAMMING AND PROGRAMMING IN C
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/I
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	CL	PSO
1	DESCRIBE THE CONCEPTS OF PROGRAMMING AND PROGRAMMING LANGUAGES.	R	2
2	IDENTIFY TOKENS IN C PROGRAMMING	R	2
3	COMPARE INPUT AND OUTPUT IN C	U	2
4	IMPLEMENTING CONTROL STATEMENTS	APPLY	1
5	IMPLEMENTING ARRAY, FUNCTIONS AND POINTERS	APPLY	1
6	EXECUTE FUNCTIONS(STRING HANDLING,MEMORY ALLOCATION)AND STRUCTURES	APPLY	1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Program Concept:**	**10**	
1.1	Program Concept, Characteristics of Programming,	1	1
1.2	Various stages in Program Development	1	1
1.3	Programming aids Algorithms, Flow Charts - Symbols, Rules for making Flow chart, Programming Techniques	2	1
1.4	Top down, Bottom up, Modular, Structured - Features, Merits, Demerits, and their Comparative study	2	1
1.5	Programming Logic-Simple, Branching, Looping, Recursion, Cohesion & Coupling	2	1
1.6	Programming Testing & Debugging & their Tools.	2	1
2.0	**C language basics:**	**10**	
2.1	C character set, Identifiers and keywords,	1	2
2.2	Data types, Enumeration type, constants, variables, declarations,	1	**2**
2.3	qualifiers ,**l**ong, short and unsigned declarations, expressions,	1	2
2.4	symbolic constants, input/output functions, compound statements,	2	2,3
2.5	arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators	2	2
2.6	Precedence and order of evaluation, conditional operators, bit operators,	2	2
2.7	type casting, using library functions in math's	1	2
3.0	**Control flow and Arrays & Strings:**	**16**	
3.1	If statement, if else statement, nested if...else statement, switch statements,	3	3
3.2	looping -for loop ,while loop, do while statements, nested loop structure	3	3
3.3	Break, continue and go to statements.	1	3
3.4	Single dimensional arrays, multidimensional arrays,	2	4
3.5	initializing array using static declaration,	1	**4**
3.6	Searching and sorting of Arrays,	2	4
3.7	Array of Characters, Character arrays and strings	2	4
3.8	String handling Functions.	2	6
4.0	**User Defined Functions:**	**18**	
4.1	Function declaration, definition & scope,	4	5
4.2	recursion,	3	5
4.3	Arrays and functions,	3	5

4.4	call by value, call by reference,		3	5
4.5	Storage Classes: automatic, external (global), static & registers.		**5**	**5**
5.0	**Structures and Pointers**		**20**	
5.1	Definition of Structures, declaration,		3	5
5.2	structure passing to functions,		3	5
5.3	array of structures, arrays with in structures,		3	5
5.4	Unions, typed statements.		2	5
5.5	Pointer Definition, pointer arithmetic,		3	5
5.6	array & pointer relationship, pointer to array,		3	5
5.7	pointer to structure, dynamic memory allocation		3	5

References:

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

Programming in C, Byron S Gottfried, and Shaums Outline series. TMH

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

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

COURSE	DETAILS
CODE	BCS106
TITLE	METHODOLOGY OF PROGRAMMING AND PROGRAMMING IN C
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/I
TYPE	CORE PRATICALS
CREDITS	2

CO NO.	COURSE OUTCOME	CL	PSO
1	USE THE SYNTAX AND SEMANTICS OF C LANGUAGE	APPLY	1,2
2	CONSTRUCT A SOFTWARE USING C PROGRAM	CREATE	1,2
3	IMPLEMENT THE FLOW CONTROL IN C PROGRAM	APPLY	1,2
4	IMPLEMENT THE ARRAY ,STRUCTURE AND POINTER	APPLY	1,2
5	STRUCTURING THE CODE : FUNCTIONS	ANALYZE	1,2

MODULE	COURSE DESCRIPTION	HR	CO
1	**Familiarization of Computer System and installation:**	**5**	
	Demonstration of various units of Computer system, handling of devices, demo on hardware units	3	1,2
	Login process, Booting Process, software installation, driver installation, printer installation etc.	2	1,2
2	**Practicing Operating System Commands:**	**10**	
	MS-DOS internal & External commands (dir., copy, del, ren, copy con, date, time, chkdsk, mkdir, cd, rmdir, EDIT etc)	2	1,2
	S-WINDOWS using start menu, desk top, task bar, word pad, note pad,	3	1,2
	file management- creation, copy, delete, moving of files in directories,	3	1,2
	selecting and executing a program-Demonstration of editing, Compiling and executing a C program using a C compiler.	2	1,2
3	**Programs using Basic Constructs**	**10**	
	Fundamental data types, qualifiers- long, short, unsigned, input/output functions	2	1,2
	scanf(), printf(), Arithmetic expressions, Evaluation of integer, real and mixed mode arithmetic expressions,	2	1,2
	type casting, relational and logical expressions, Conditional operators,	2	1,2
	Trigonometric functions- sin(), cos(), tan(),	2	1,2
	mathematical functions abs(), sqrt(), round() defined in math.h	2	1,2
	Printing formatted outputs using width specifier.	2	1,2
4	**Programs using control structures:**	**10**	
	If, switch, for, while, do while, nested structures, break and continue.	2	3
	Sample programs should include printing of Fibonacci numbers, prime numbers, check for Armstrong numbers, summation series	3	3
	exp(x), sin series etc and verification of result using built in functions,	2	3
	printing pyramid like pattern & other similar patterns using nested loops	3	3
5	**Programs using Arrays:**	**10**	
	Array based programs	2	4
	Creation of array containing prime numbers, matrix addition, matrix multiplication, transpose of a matrix,	2	4
	Array sorting, preparing rank lists based on marks, searching of arrays (linear) for finding price of an item.	3	4
	Static initialization of arrays.	3	4
6	**String manipulation programs**	**5**	
	eading strings using %s, gets(), getchar(), copying one string into another, counting number of characters, vowels, words etc, using string handling functions.	5	5
7	**User Defined Functions:**	**10**	
	Programs using return type functions, void type functions,	3	5
	example program using recursive functions,	3	5

	array sorting program using function with call by reference,	2	5	
	Function to copy one string into another.	2	5	
8	**Program using structures:**	**10**		
	array of structures	3	4	
	program using structure containing arrays and array of structures	3	4	
	Rank list preparation	4	4	
9	**Simple program using pointers**	**5**	4	

SEMESTER-II

COURSE	DETAILS
CODE	BCS203
TITLE	DATA STRUCTURES
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/II
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	CL	PSO
1	KNOWLEDGE OF ADVANCED ADT AND DATA STRUCTURES AND THEIR IMPLEMENTATIONS	U	1,2
2	ABILITY TO IMPLEMENT ALGORITHMS TO PERFORM VARIOUS OPERATIONS ON DATA STRUCTURES	APPLY	1,2
3	UNDERSTAND DS USED FOR REPRESENTING DATA IN MEMORY LIKE ARRAYS, LINKED LIST AND TREES.	U	1,2
4	UNDERSTANDING OF VARIOUS SEARCHING AND SORTING ALGORITHM INCLUDING INSERTION SORT, SELECTION SORT AND QUICK SORT	U	1,2
5	DESCRIBE THE HASH FUNCTION AND CONCEPTS OF COLLISION AND ITS RESOLUTION METHODS	U	1,2
6	DEMONSTRATE ADVANTAGES AND DISADVANTAGES OF SPECIFIC ALGORITHMS AND DATA STRUCTURES.	APPLY	1,2
7	DETERMINE AND ANALYZE THE COMPLEXITY OF GIVEN ALGORITHMS	A	1,2

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Programming Concepts**	**8**	**1**
1.1	Introduction , Basic Terminology, Data Structure Operations	2	1
1.2	Algorithm: Definition, Algorithm Analysis, Complexity	2	1
1.3	Asymptotic Notation, Recursion.	4	1
2.0	**Array and String**	**10**	**1,3,6**
2.1	Introduction, Linear Arrays, Representation of Linear Arrays in Memory, traversing Linear Arrays	2	1,3,6
2.2	Insertion and Deletion in Linear Arrays; Multidimensional Arrays; Matrices, Sparse Matrices.	2	3

2.3	String: Basic Terminology, Representation, String Operations, Pattern Matching Algorithm	2	3
3.0	**Stack And Queue**	**12**	**1,3,6**
3.1	Introduction, Array Representation and Basic Operations; Implementation of Stacks	3	1,3,6
3.2	Application of Stacks-Evaluating Arithmetic Expression using Stacks -Infix to Postfix Notation.-Evaluating a Postfix Notation-	5	3
3.3	Queue: Introduction, Implementation of Queue, Priority Queue, Dequeue	4	3
4.0	**Linked List**	**14**	**3**
4.1	Introduction, Representation of Linked List, Traversing, Searching a list, Insertion and Deletion in a Linked List	6	3
4.2	Header Linked List, Doubly and Circular Linked List	6	3
4.3	Garbage Collection	2	3
5.0	**Non Linear Data Structures and Algorithms**	**12**	**3**
5.1	Trees - Introduction, Binary Trees, Representation, Traversing and its Algorithms	5	3
5.2	Threaded Trees, Binary Search Trees; Heap Trees	4	3
5.3	Huffman's Algorithm, Application of Trees	5	3
6.0	**Sorting And Searching:**	**8**	**4,6**
6.1	Bubble sort, Insertion sort, Selection sort, Heap sort, Quick sort, Merge sort; Comparison of sorting algorithms	4	4,6
6.2	Linear Search, Binary Search; Comparison of searching algorithms.	4	4,6

References:

Schaums Outline Series: Theory and Problems of Data Structures-Seymour Lipschutz
Introduction to data structures with application-Jean-Paul Tremblay & Sorenson
Data structures using c and C++, Tanenbaum

COURSE	DETAILS
CODE	BCS205
TITLE	OBJECT ORIENTED PROGRAMMING USING C++
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/II
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the principles of oops concept ,control structure and overloading	U	2
2	Analyze the concept of classes and object, array, functions.	A	2
3	Understand the concept of constructors, inheritance and classification.	U	2
4	Execute the concept of Pointers and virtual function	APPLY	2
5	Discuss to work with files, file pointers and its manipulations	U	2

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Introduction to object oriented concepts,**	**16**	
1.1	features of object oriented programming,	1	1
1.2	C++ programming basics, Data types, operators, precedence of operators,	3	1
1.3	Control flow, functions, arrays and strings, operations on arrays, string manipulations.	4	2
1.4	Classes and objects,	2	2
1.5	constructors, destructors, objects as function arguments,	3	2
1.6	Inline functions, friend functions, friend classes, array of objects.	3	2
2.0	**Overloading,**	10	
2.1	operator overloading,	2	1
2.2	overloading unary operators, overloading binary operators,	3	1
2.3	function overloading,	3	1
2.4	data conversion	2	1
3.0	**Inheritance**	10	
3.1	Base class and derived class ,	3	3
3.2	forms of inheritance, public inheritance, private inheritance,	4	3
3.3	Constructors in derived class.	3	3
4.0	**Virtual functions, pointers,**	**14**	
4.1	pointers, memory management, new and delete	2	4
4.2	pointers within a class, pointers to objects,	2	4
4.3	array of pointers to objects, pointer to object members	2	4
4.4	pointer to derived class objects, pointers to pointers	2	4
4.5	polymorphism, virtual function,	2	4
4.6	pure virtual function, abstract classes	2	4
4.7	late binding, early binding, the this pointer	2	4
5.0	**Files and streams**	**14**	
5.1	streams, predefined console streams	3	5
5.2	string I/O, object I/O	2	5
5.3	files, file modes, file pointers	3	5
5.4	file input/output ,command line arguments	3	5
5.5	Templates, exception handling.	3	5

References:

E.Balaguruswamy, Object Oriented Programming in C++

Schaums Outline series, Programming in C++

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

Stroustrup, Bjarne, the C++ Programming Language, Addison Wesley

Robert Lafore, Object Oriented Programming in C++, McGraw Hill

COURSE	DETAILS
CODE	BCS206
TITLE	OBJECT ORIENTED PROGRAMMING USING C++
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/II
TYPE	CORE PRATICALS
CREDITS	2

CO NO.	COURSE OUTCOME	CL	PSO
1	USE THE OOP CONCEPTS AND INLINE,FRIEND FUNCTIONS	APPLY	2
2	EXECUTE THE CONCEPT OF CONSTRUCTORS, DESTRUCTORS AND ARRAY OF OBJECTS	APPLY	2
3	IMPLEMENT THE CONCEPT OF OVERLOADING,POINTERS AND FILES	APPLY	2
4	USE THE CONCEPT OF INHERITANCE	APPLY	2
5	IMPLEMENT THE CONCEPT OF TEMPLATES AND EXCEPTION HANDLING	APPLY	2

MODULE	COURSE DESCRIPTION	HR	CO
1	Simple Programs using OOP concepts	**8**	1
2	Inline and friend functions	6	1
3	Constructors and destructors	6	2
4	Array of objects	6	2
5	Over loading	6	3
6	Inheritance	6	4
7	Pointers and memory management	8	3
8	Virtual functions	6	3
9	Files, Command line arguments	6	3
10	Templates and Exception handling	6	5

COURSE	DETAILS
CODE	BCS302
TITLE	SYSTEM SOFTWARE
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/III
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	UNDERSTAND THE FUNDAMENTALS OF LANGUAGE PROCESSING AND MACROS	U	3
2	IDENTIFY LINKING AND LOADING CONCEPTS.	R	3
3	UNDERSTAND TYPES OF PROGRAMMING LANGUAGE GRAMMARS AND PARSE TREE CONSTRUCTION	U	3
4	IDENTIFY DIFFERENT COMPONENTS OF A COMPILER AND THEIR FUNCTIONING.	R	3
5	EXPLAIN SCANNING ,PARSING AND CODE OPTIMIZATION TECHNIQUES	U	3

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**System software**	**8**	
1.1	System software- General concepts	1	1
1.2	Assemblers- Design of assembler	2	1
1.3	Macros and Microprocessor	1	1
1.4	Macro definitions& Instructions	2	1
1.5	Features of macro facility, Nested macros calls	2	1
2.0	**Loading & Linking**	**8**	
2.1	Loading, Linking & Relocating	1	**2**
2.2	Loading& Linking Schemes- Relocatablity of Programs	1	2
2.3	Concepts of Binders, Linking Loaders,	2	2
2.4	Overlays, Dynamic Binders,	2	2
2.5	Design of an absolute loader.	2	2
3.0	**Compiler**	**16**	
3.1	Phase of compiler,	2	4
3.2	Aspects of Compilation- Data types, Data Structure, Scope rules,	4	4

		Control structure		
3.3	Compilation Process- Analysis phase, Synthesis phase,	3	4
3.4	Programming language grammars	3	**3**
3.5	Derivations, Reduction and system trees.	4	3
4.0	**Scanning and Parsing**	**16**	
4.1	Classification of grammars,	3	5
4.2	Ambiguity in program specification,	2	5
4.3	Lexical Scanner,	3	5
4.4	Parsing-Top down, Bottom up,	5	5
4.5	Table driven parsing.	3	5
5.0	**Compilation of expressions**	**16**	
5.1	Compilation of expressions	4	5
5.2	Intermediate code forms for expressions	4	5
5.3	Compilation of control structures	4	5
5.4	Code optimization- Local and Global.	4	5

References:

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

System Programming - John J Donovan (Tata McGraw Hill)

Design of Compilers Aho & Ullman

COURSE	DETAILS
CODE	BCS303
TITLE	DATABASE MANAGEMENT SYSTEM
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/III
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	CL	PSO
1	UNDERSTAND ABOUT DATA AND ARRANGEMENT OF DATA	U	3
2	SUMMARIZE DIFFERENT DATA LANGUAGES SCHEMES	U	2
3	ANALYSE DIFFERENT DATA MODELS DDL ,DML,DCL,TCL	ANLZ	1
4	RECOGNIZE AND INTERPRET DIFFERENT DATA MODELS ERMODEL, RELATIONAL MODEL ETC.	R	1
5	CLASSIFY DIFFERENT DBMS LANGUAGES AND COMPONENTS	U	2

6	UNDERSTAND AND IMPLEMENT DIFFERENT SQL QUERIES	U	1
7	EXECUTE AND IMPLEMENT DIFFERENT PROJECT ASPECT DEMO DATABASE	APPLY, CREATE	4
8	EXPLAIN DIFFERENT NORMALIZATION AND INDEXING ASPECTS	U	1
9	EXPLAIN DIFFERENT TRANSACTION AND SECURITY ASPECTS OF DBMS	R	1
10	GENERATE DIFFERENT DATABASE SQL AND PLSQL BASED QUERY FORMAT	CREATE	1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Introduction**	15	1,2,7
1.1	Characteristics of the Database Approach Data independences Database languages and Interfaces, Entity ,Relationship model	2	1
1.2	Database users : DBA , Database Designers ,End users	2	1
1.3	Advantages of using the DBMS Approach	2	1
1.4	Data models, Schemas and Instances Entity sets, attributes and keys- Relationships, Relationship types and structural constraints Weak and strong entity-	2	1
1.5	Three-Schema Architecture and Data Independence Enhanced Entity Relationship (EER) and object modelling.- specialization and generalization	2	1
1.6	DBMS Languages: DDL, DML DDL, DML, DCL, Database Administrator Duties.	2	1,2
1.7	The Database System Environment: DBMS Component Modules Introduction: Characteristics of the Database approach Problems with file system data management, Data models, Schemas and instances ,DBMS architectures	3	1
2.0	**Relational Model** **Entity Relationship Modelling** **Relational Model concepts**	15	4
2.1	Introduction –Entity Types , Entity Sets , Attributes and Keys	2	4
2.2	Relationship Types ,Relationship Sets, Roles , and Structural Constraints	2	4
2.3	Weak Entity Types – Notation	2	4
2.4	ER diagrams – Sample ER diagrams	2	4
2.5	Domains ,Attributes , Tuples , and Relations	2	4
2.6	Characteristics of Relations Relational Model Constraints	2	4
2.7	Relational Database Schemas : Domain Constraints, Key Constraints	2	4
2.8	Relational Database Schemas , Entity Integrity , Referential Integrity, and Foreign Keys	1	4
3.0	SQL queries	15	3,6,10,

			5
3.1	Data Types – Data Definition commands: CREATE, ALTER DROP - Adding constraints in SQL, Physical Data organization- Hashed files- Indexed files- B- Trees, sequential Organization files. The relational Data model concepts-Relational model constraints- The Relational algebra- Tuple relational calculus, Domain relational calculus- SQL	3	3
3.2	Basic SQL Queries : INSERT ,SELECT ,DELETE ,UPDATE - Substring comparison using LIKE operator ,BETWEEN operator	3	6
3.3	Ordering of rows – SQL set operations :UNION , EXCEPT , INTERSECT	3	6
3.4	Complex Queries: Comparison involving NULL and Three-valued logic ıntroduction to Object oriented databases- Features- Object identity- Object containment- Inheritance-OODBMS and ORDBMS Databases and Internet Introduction To Data Mining and Data warehousing.	2	3
3.5	Nested queries , EXISTS and UNIQUE functions, Renaming of attributes and Joining of tables	2	3
3.6	Aggregate functions ,Grouping Database design- Functional dependencies- Basic definitions- Trivial and non-trivial dependencies- Closure of a set of dependencies-closure of a set of attributes	1	3
3.7	Managing Views Irreducible set of dependencies- Non☐ loss decomposition and functional dependencies First, Second and Third Normal forms- Boyce Codd Normal forms	1	3
4.0	**Normalization and Indexing Structures for Files Normalization Indexing Structures for files**	15	8
4.1	Informal Design Guidelines for Relational Schemas –Functional Dependencies – Normal forms	3	8
4.2	First Normal Form , Second Normal Form , Third Normal Form	3	8
4.3	General Definitions of Second and Third Normal Forms –Boyce-Codd Normal Form.	3	8
4.4	Types of Single-Level Ordered Indexes Database recovery techniques- Recovery techniques based on deferred updates and immediate update, shadow paging	3	8
4.5	Primary Indexes, Clustering Indexes Database Security and Authorization-Access control based on granting/Revoking of privileges.	2	8
4.6	Secondary Indexes. Transaction processing- Desirable properties of transactions- Serializability of schedules Concurrency control techniques- Locking techniques- Time stamp Ordering and multi version techniques	1	8
5.0	**Transaction Processing and Database Security Transaction Processing Database Security and Authorization**	15	8
5.1	Introduction to Transaction Processing - Transaction and System Concepts –Desirable properties of Transactions Distributed databases- Centralized systems-Motivation of distributed databases- concepts-Types of distributed systems- Distributed Query processing-Commit protocols for distributed databases.	5	8

5.2	Types of Security – Control measures – Database Security	5	8
5.3	DBA – Access Control , User Accounts, and Database Audits – Access Control based on Granting and Revoking Privileges	5	8

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References:

Silberschatz, H.F Korth, and S Sudarsan, Database system concepts4/e, Tata McGraw Hill, 2002

Elmasri and Navathe, Fundmentals of Database Systems 3/e, Pearson Education, 2003

Peter Rob, Carlos Coronel, Database systems- Design Implementation and Management, Thomson 7/e.

C.J Date, an Introduction to Database Systems, 7/e, Pearson Education, 2000

V K Jain DBMS, Wiley Dream Tech India P Ltd N Delhi.

Begin C. Desai.An Introduction to Database Systems, Galgotia Publications, 2001

COURSE	DETAILS
CODE	BCS304
TITLE	DATA COMMUNICATION
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/III
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	UNDERSTAND AND ANALYSE PRINCIPLES OF DATA AND SIGNALS FOR BETTER DATA TRANSMISSION	U	3
2	ANALYSE DIFFERENT TRANSMISSION MEDIA FOR CONTROL THE DATA COMMUNICATION IN EFFECTIVE MANNER	ANLZ	1
3	SUMMARIZE DIFFERENT ANALOG AND DIGITAL TRANSMISSIONS FOR PROPER COMMUNICATION	U	2
4	UNDERSTAND DIFFERENT SWITCHING TECHNOLOGY AND CABLE CONNECTION FOR COMMUNICATION IMPLEMENTATION	U	1
5	ANALYSE DIFFERENT COMPLETE DATA COMMUNICATION SCHEMES FOR BETTER DATA TRANSMISSION THROUGH COMMUNICATION CHANEL	ANLZ (COMMON)	1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Data and Signals**	20	1
1.1	Analog and Digital Data, Analog and Digital Signals, Periodic and No periodic, Periodic Analog signals, Communication Devices :- Digital Data Transmission-DTE-DCE-Interface-Other Interface Standards-Modem- Different Types □ Hub □ Repeaters □ Switches □ Routers □ Comparison □ NIC - Multilayer Devices.	5	1
1.2	Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signals, Bit Rate, Digital Signal as a Composite Analog Signal, Transmission of Digital and Analog Signals	5	1
1.3	Transmission Impairment, Attenuation, Distortion, Noise, Data rate limits, Noiseless channel: Nyquist bit rate Error Detection and Correction: - Errors Types Detection - Redundancy Check Vertical Horizontal Cyclic Checksum Correction - Humming Code -Burst.Wireless Devices and Wired Devices: - Cables for Communication - CAT 5 UTP	5	1
1.4	Noisy Channel: Shannon Capacity, Simplified Communication & Data Communication models. Data Flow-Simplex, Half Duplex, Full Duplex. - BNC, Optic Transmission and Reception. Different Transmission Modes.	5	1
2.0	**Transmission Media**	10	2
2.1	Guided media, Twisted-pair cable – UTP, STP, Connectors Coaxial Cable, and Connectors Fiber-Optic Cable Switching Packet Circuit - Message. Approaches. Frame Relay: - Introduction-Layers - Congestion Control -Traffic Control - Other Features.	5	2
2.2	Propagation Modes, Unguided Media - Wireless Transmission – Terrestrial Microwave, Satellite Microwave, Radio Waves. Infrared. Upper OSI Layers Session - Session and Transport Interaction Synchronization SPDU Presentation Translation - Encryption and Decryptions Authentication - Data Compression , Application MHS ,FTAM ,VT DS - CMIP	5	2
3.0	**Digital Transmission**	15	3
3.1	Analog to Digital Conversion: Block Diagram of Digital Communication System. Parallel and serial ports	5	3
3.2	Pulse Code Modulation(PCM), Sampling, Sampling Rate, Quantization, Delta modulation, Adaptive Delta Modulation	5	3
3.3	Transmission modes, Parallel Transmission, Serial Transmission, Asynchronous Transmission, Synchronous Transmission	5	3
4.0	**Analog Transmission**	15	3
4.1	Digital to Analog Conversation, Modulation of Digital Data, Bit Rate, Baud Rate, Carrier signal	5	3
4.2	ASK, FSK, PSK, AND QAM. Analog to Analog modulation, Amplitude Modulation, Frequency Modulation	2	3
4.3	Phase Modulation. Bandwidth Utilization : Multiplexing and	3	3

	Spectrum Spreading : Multiplexing			
4.4	FDM, WDM, TDM, Synchronous TDM, Digital Signal Services, Statistical TDM, Spread Spectrum, FHSS, DSSS		5	3
5.0	**Switching**		15	5
5.1	Circuit-Switched Networks, Three Phases, Packet Switching, Datagram Networks - Character Oriented - Bit Oriented HDLC - Link Access Procedures.		1	5
5.2	Three Phases, Connection Oriented and Connectionless Services. Data Link Control - Line Discipline - ENQ/ACK - Poll/Select - Flow Control - Stop and Wait - Sliding Window - Error Control ARQ - Different Types. Data Link Protocols - Asynchronous and Synchronous Protocols Frames		3	5
5.3	Telephone Network :Major Components, Local Loops, Trunks, Switching Offices		3	5
5.4	Dial-Up service, Digital Subscriber Line,		3	5
5.5	Virtual-Circuit networks, HFC Network, Cable TV for data transfer		3	5
5.6	Cable Networks, Traditional Cable Networks		2	5

References:

Data Communication and Networking by Behrouz A. Forouzan.
Data & Computer Communications, William Stallings
Electronic Communication Systems, Kennedy and Davis
Principles of Communication Systems, Taub and Schilling of study:

COURSE	DETAILS
CODE	BCS305
TITLE	COMPUTER ORGANIZATION
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/III
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the functionality, organization and implementation of computer system.	U	1,3
2	Recognize the instruction codes and formats.	R	1,3
3	Examine the various addressing modes and formats of different CPUs.	U	1,3
4	Discuss the internal working of main memory, cache memory, associative memory and various modes of data transfer.	U	1,3

	5	Understand the working of processing unit and input-output organization	U	1,3

MODULE		COURSE DESCRIPTION	HR	CO
1.0			**12**	
1.1		Functional units, Basic operational concepts	2	1
1.2		Bus structures, numbers, arithmetic operations and characters,	2	1
1.3		memory locations, and address, memory operations,	2	1
1.4		instruction execution and straight line sequencing,	2	2
1.5		branching, control codes	2	2
1.6		addressing modes	**2**	**3**
2.0		**The memory system:**	**18**	
2.1		basic concepts, semiconductor Ram memories,	4	4
2.2		Internal organization of memory chips, memory system considerations.	4	4
2.3		ROM, PROM, EPROM, EEPROM, Flash memory, Speed, size and cost.	5	4
2.4		Cache memories, performance considerations, interleaving	5	4
3.0		**Arithmetic unit**	**14**	
3.1		addition and subtraction of signed numbers,	2	4
3.2		addition/subtraction logic unit, design of fast adder	2	4
3.3		multiplication of positive numbers, signed operand multiplication	3	4
3.4		Booth algorithm	2	4
3.5		Fast multiplication, bit pair recording of multiplication,	2	4
3.6		carry save addition of summands, integer division	3	4
4.0		**Processing unit:**	**18**	
4.1		Fundamental concepts, register transfers,	3	5
4.2		performing an arithmetic or logic operations,	3	5
4.3		fetching a word in memory, execution of a complete instruction,	3	5
4.4		branch instruction, hardwired control,	**4**	5
4.5		A complete processor, micro programmed control.	4	5
5.0		**Input/output organization:**	**10**	
5.1		accessing I/O devices	3	5
5.2		Interrupts, enabling and disabling interrupts	3	5
5.3		handling multiple devices,	2	5
5.4		Direct memory access, bus arbitration	2	5

References:

Computer Organisation-Hamacher Vranesic Zaky (Fifth edition) Mc Graw Hill

Structured Computer Organisation-Andrew s Tannenbaum

Computer Organisation and Architecture-William Stallings

COURSE	DETAILS
CODE	BCS306
TITLE	RDBMS-ORACLE
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/III
TYPE	CORE PRACTICALS
CREDITS	2

CO NO.	COURSE OUTCOME	CL	PSO
1	Implement DDL and DCL commands	apply	1,2
2	Execute sql commands	apply	1,2
3	Use different types of queries	apply	1,2
4	Implement the concept of views	apply	1,2
5	Execute PL/SQL commands	apply	1,2

MODULE	COURSE DESCRIPTION	HR	CO
1	Basics: Connecting to RDBMS Server- user login invoke SQL plus.SQL plus: Naming a table- assigning storage data types- Display formats- creating tables- Creating tables from other tables- Creating Synonyms-Describing Table Structures-Commands Changing table structures-Altering and dropping tables-Manipulating data in tables- Inserting data into tables Using UPDATE to change data- DCL commands- GRANT, REVOKE, COMMIT, ROLLBACK-AUTOCOMMIT Deleting rows	20	**1**
2	Adding columns- saving and retrieving SQL commands- Editing SQL commands And SQL*plus commands	8	2
3	Query: Querying single tables- Projection, selection- Ordering, grouping results-accessing records from multiple tables-Subqueries-Correlated subqueries-Connecting Queries.	14	3
4	Views: Defining a view-granting view access to others-Querying views- creating synonyms-Defining multiple view with JOIN and without JOIN- Inserting, deleting and updating data through views- dropping views	10	4
5	PL/SQL: simple program using control structures-Cursors-Exceptions-Triggers-Procedures-Functions	12	5

SEMESTER-IV

COURSE	DETAILS
CODE	BCS401
TITLE	VISUAL PROGRAMMING
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/IV
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	Taxonomy	PSO
CO1	UNDERSTAND THE CONCEPT OF EVENT DRIVEN PROGRAMMING AND TYPES OF VB PROJECTS	U	PSO2
CO2	DISCUSS THE VARIOUS PROGRAMMING ELEMENTS IN VB	U	PSO2
CO3	SUMMARIZE VARIOUS FORMS CONTROLS AND DATA BASE CONCEPT	U	PSO2
CO4	EXPLAIN REPORTS AND ACTIVE X CONTROLS	U	PSO2
CO5	IDENTIFY THE VARIOUS WEB TECHNOLOGIES	R	PSO2

UNIT	COURSE DESCRIPTION	Hrs.	CO
1.0	**Introduction to Windows**	**6**	
1.1	GUI concept, Concept of Event driven programming,	1	1
1.2	The Visual Basic IDE(5.50) ,	1	1
1.3	Types of Visual Basic Projects,	1	1
1.4	Visual Basic Editions,	1	1
1.5	The Visual Basic Project Lifecycle,	1	1
1.6	Project Files.	1	1
2.0	**Programming Elements**	**22**	
2.1	Data types- Constants- Variables- operators	2	2
2.2	user defined data types-Library Functions- Program Comments	4	2
2.3	Arrays , Dynamic Arrays-	2	2
2.4	Strings- Enumerations. Logic Statement	4	2
2.5	Conditional Constructs (if / Then, Select Case)	2	2
2.6	Iteration (Do Loop, For Loop, Do Events- Exit, Stop and End.	2	2
2.7	Functions and Subroutines- Arguments	**2**	2
2.8	ByRef vs. ByVal Parameters- Optional Argument	2	2
2.9	Module Basics-Event Procedures- Class Modules	1	2

2.10	Types of Errors, Error handling, Creating Error Handlers	2	2
2.11	Debugging, Debugging Tools.	1	2
3.0	**Forms**	**14**	
3.1	Controls, Control arrays	2	3
3.2	menus, menu editor,	2	3
3.3	Graphics programming, Simple animation	2	3
3.4	SDI, MDI Applications	2	3
3.5	Database Concepts- Visual data manager	2	3
3.6	The ADO Data Control-Data Grid Control , DB List and DB Combo Controls	**2**	3
3.7	Data view Window- Data form Wizard	1	3
3.8	Data Environment Designer.	1	3
4.0	**Report using Crystal Reports**	**10**	
4.1	Report using Crystal Reports, data environment	2	47
4.2	Reports using reports- Error handling	2	4
4.3	Creating Active X controls,	4	4
4.4	Active EXE, Active X DLL.	2	4
5.0	**Introduction to the Web**	**12**	
5.1	Internet & Web Protocols	2	5
5.2	HTML, Structure of HTML documents	2	5
5.3	Attributes, Basic HTML Tags,	2	5
5.4	Forms and Controls,	2	5
5.5	VB Scripts, DHTML, DHTML object model	2	5
5.6	ASP, ASP object model.	2	5

References:

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

COURSE	DETAILS
CODE	BCS403
TITLE	COMPUTER NETWORKING & INTERNET
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/IV
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Know the basic of networks and connections in network	U	PSO2
2	Learn the network types and routing algorithm	U	PSO2
3	Understand various protocols	U	PSO2
4	Explaining wireless networks and its applications	U	PSO1
5	Explain various information security techniques to safe guard the valuable information from one end to another	U	PSO4

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Overview**	12	1
1.1	Networking terminology	1	1
1.2	network types- Transmission Media	1	1
1.3	Control Schemes	1	1
1.4	Layered Architecture	2	1
1.5	OSI Reference Model	2	1
1.6	TCP/IP Reference Model	2	1
1.7	Telephone Networks	1	1
1.8	Leased Lines , PSTN , ISDN	1	1
1.9	Broadband Communications , ISPs.	1	1
2.0	**Geographical Classifications of Network**	12	2
2.1	Ethernet	1	2
2.2	LAN Interconnection Topologies- Fast Ethernets	1	2
2.3	VLANs	1	2
2.4	Protocols	1	2
2.5	Frame Relay	1	2
2.6	MAN	1	2
2.7	IP Addresses	2	2
2.8	Routing Algorithms-Internet Routing	2	2
2.9	IPv4/6	1	2
2.10	NAT	1	2
3.0	**TCP/IP**	14	3
3.1	TCP/IP	4	3
3.2	UDP	4	3
3.3	DNS	2	3
3.4	Electronic Mail	2	3
3.5	FTP ,TFTP, SNMP	2	3
4.0	**Wireless Networks**	12	4
4.1	Blue Tooth	2	4
4.2	Cellular Radio Networks	2	4
4.3	Wireless LANs	2	4
4.4	Cable Television Networks	2	4
4.5	Satellite Television Networks	2	4
4.6	Interactive Services.	2	4
5.0	**Internet**	14	5
5.1	Web Servers - Applications	2	5
5.2	URLs- WWW- HTTP & MIME	2	5
5.3	HTML & XML	1	5
5.4	Protocols	1	5

5.5	Languages , Scripts, RTSP, WAP	2	5
5.6	Securities , Basic Techniques	2	5
5.7	Data Encryption , Authentication	2	5
5.8	Network and Web Security , Privacy.	2	5

References:

Computer Networking & Internet (Fred Halsall, Lingana Gauda Kulkarni).

Computer Networks (Andrew S Tanenbaum)

Data and Computer Communications (William Stallings)

Data communication and Networking (Behrouz A Forouzan)

COURSE	DETAILS
CODE	BCS404
TITLE	OPERATING SYSTEMS
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/IV
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	DESCRIBE THE ARCHITECTURE AND COMPONENTS OF OPERATING SYSTEM	R	3
2	EXPLAIN THE IMPORTANCE OF PROCESS SCHEDULING AND SYNCHRONIZATION.	U	3
3	SUMMARIZE THE ISSUES IN DEADLOCKS	U	3
4	UNDERSTAND THE CONCEPT OF MEMORY MANAGEMENT	U	3
5	DISCUSS ABOUT FILE SYSTEM AND DEVICE MANAGEMENT	U	3

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Definition**	**7**	
1.1	Definition- Functions- OS as Resource Manager, Types	2	1
1.2	Structure- Concept of Batch Processing, multi-programming, multi-user Systems and Real-time system	3	1
1.3	POST, Bootstrapping , Kernel	2	1
2.0	**Process management:**	**22**	
2.1	process concept, process scheduling,	2	2
2.2	operations on processes, cooperating processes	2	2
2.3	interposes communication, communication in client server systems,	**2**	**2**

2.4	threads, overview, multithreading models	2	2
2.5	CPU scheduling, scheduling criteria,	2	2
2.6	CPU scheduling algorithms, process synchronization	5	2
2.7	critical-section problem-semaphores,	2	2
2.8	deadlocks, prevention, avoidance and detection	5	3
3.0	**Storage Management:**	**16**	
3.1	memory management, contiguous memory allocation,	2	4
3.2	paging, segmentation	2	4
3.3	segmentation with paging	3	4
3.4	virtual memory, demand paging	3	4
3.5	Page replacement,	3	4
3.6	Allocation of frames, thrashing.	3	4
4.0	**File-System Interface:**	**14**	
4.1	file concept, access methods	2	5
4.2	directory structure, file system structure	2	5
4.3	file system implementation,	1	5
4.4	allocation methods, free space management,	3	5
4.5	File protection and security- protection concepts, security problem,	3	5
4.6	User authentication, program threats, system threats.	3	5
5.0	**Device Management**	**5**	
5.1	types of devices-dedicated, shared	2	5
5.2	device scheduling	1	5
5.3	virtual devices- spooling	1	5
5.4	Concept of device drivers.	1	5

References:

Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (Addison Wesley)

Operating System- Manick & Donovan (McGrawHill)

Operating system, M Deitel (Pearson Education)

System programming & Operating Systems, D.M. Dhammdhere (Tata McGraw Hill)

SEMESTER-V

COURSE	DETAILS
CODE	BCS501
TITLE	COMPUTER AIDED OPTIMIZATION TECHNIQUES
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/V
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Identify and develop operational research models from the verbal description of the real system	U	PSO5
2	Understand the mathematical tools that are needed to solve optimisation problems	U	PSO5
3	understand importance of optimization of industrial process management	U	PSO5
4	Apply basic concepts of mathematics to formulate an optimization problem	APPLY	PSO5
5	Analyse and appreciate variety of performance measures for various optimization problems	ANALYZE	PSO5

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Linear Programming Problem- Graphical method & simplex method**	10	2
1.1	Linear Programming: Mathematical formulation	2	2
1.2	Graphical methods of solution, general properties	2	2
1.3	Simplex method, Duality, dual simplex	3	2
1.4	post-optimality analysis	3	2
2.0	**Transportation Problem and Assignment Problems**	12	3
2.1	Transportation and transshipment problems	4	3
2.2	assignment problems	4	3
2.3	sample programs	4	3
3.0	**Network Analysis**	14	1,3,5
3.1	CPM and PERT, Shorter route problem	2	1,3,5
3.2	maximal flow problem	3	1,3,5
3.3	project scheduling	3	1,3,5
3.4	critical path calculations	3	1,3,5
3.5	PERT calculations, Sample programs	3	1,3,5
4.0	**Inventory models**	14	4, 5
4.1	Deterministic inventory models	2	4, 5
4.2	infinite delivery rate with no back orders	3	4, 5
4.3	infinite delivery rate with back orders	3	4, 5

4.4	finite delivery rate with back orders	3	4, 5
4.5	Introduction to probabilistic inventory models, sample programs	3	4, 5
5.0	**Sequencing Problem**	14	1,3
5.1	Processing n jobs through 2 machines	3	1,3
5.2	Processing n jobs through k machines	3	1,3
5.3	Processing 2 jobs through k machines	4	1,3
5.4	Maintenance and Crew Scheduling	4	1,3

References:

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

Operations Research: An Introduction, Hamdy A. Taha (Prentice Hall of India)

Introduction to Operations Research: Computer oriented Algorithmic (Mc Graw Hill 1976)

Quantitative Techniques in Management Volma N.D (T.M.II 1990)

Operations Research for management Shenoy G. VSrivastava& Sharma (Wiley Eastern II edition)

COURSE	DETAILS
CODE	BCS502
TITLE	SYSTEM ANALYSIS AND DESIGN
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/V
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	IDENTIFY THE VARIOUS TYPES OF INFORMATION SYSTEM CONCEPTS AND TERMINOLOGIES.	R	1
2	UNDERSTAND THE ISSUES AND RESPONSIBILITIES OF SYSTEM ANALYST	U	1
3	DESCRIBE THE BASIC TOOL OF SYSTEM ANALYSIS.	R	1
4	DISCUSS THE INITIAL PHASES OF SYSTEM DEVELOPMENT LIFE CYCLE.	U	1
5	EXAMINE THE DIFFERENT ISSUES RELATED TO SYSTEM DESIGN	R	1
6	EXPLAIN A WIDE RANGE OF PROBLEMS RELATED TO THE SYSTEM DEVELOPMENT ACTIVITIES.	U	1
7	CREATE TEAM BUILDING , COMMUNICATION AND INTERVIEWING SKILLS	C	4

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Introduction**	**10**	
1.1	Information systems concepts, Business information systems;	1	1
1.2	Describing the business organization – organization chart , organization function list	2	1
1.3	Information system levels - operational, lower, middle, top management;	1	1
1.4	The system development life cycle concepts; hardware and software end products.	2	1
1.5	Life cycle activities- life cycle flow chart, task,	1	1
1.6	Management review, baseline specifications, role of system analyst.	3	2
2.0	**Basic tool of system analysis**	**14**	
2.1	Identification codes – definition, need for codes	1	3
2.2	Code plan, code dictionary, common type of codes	2	3
2.3	Forms design – basic parts of form, style and types of form, principles of form design	3	3
2.4	Tools for structure analysis and design: Types of basic charts, decision tables, decision trees, structured English	3	3
2.5	Data flow diagram, data dictionary, system flow charts, flow charting symbols	3	3
2.6	Information oriented flow charts, process oriented flow charts, HIPO charts.	2	3
3.0	**Study phase**	**12**	
3.1	Study phase activities	1	4
3.2	Information service request, initial investigation	3	4
3.3	Fact finding techniques ,fact analysis techniques	3	4
3.4	Steps in feasibility analysis	3	4
3.5	Study phase report.	2	4
4.0	**Design phase**	**12**	
4.1	Design phase activities	2	5
4.2	Structure design	2	5
4.3	Input design- input data, input media and devices	3	5
4.4	Output design	3	5
4.5	Design phase report.	2	5
5.0	**Development phase**	**10**	
5.1	Development phase activities	1	6
5.2	Bottom up and top down computer program development	2	6
5.3	Training- programmer, operator, user trainings	2	6
5.4	Conversion; change over plan; steps in computer program development	3	6
5.5	Structured programming; development phase report.	2	6
6.0	**Operation phase**	**8**	
6.1	Operation phase activities	1	7
6.2	Change over crisis	2	7
6.3	Change over activities	2	7
6.4	Routine operations; security	2	7
6.5	Performance evaluation.	1	7

References:

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

System Analysis and Design, Elias M Awad, Galgotia Book Source.

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

COURSE	DETAILS
CODE	BCS503
TITLE	PROGRAMMING IN JAVA
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/V
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	Taxonomy	PSO
CO1	Understand the basic oops concept, Java evaluation, features and implementation overview.	Create	PSO2
CO2	Know behaviour of primitive data types, operators and expressions, decision making and branching, decision making and looping	Create	PSO2
CO3	Able to understand classes and methods, array, strings and interfaces concept instead of multiple inheritances	Create	PSO2
CO4	Package of java, multithreaded programming contains synchronization, managing errors and exceptions handling.	Create	PSO2
CO5	Create Java applications with graphical user interface (GUI – AWT, Applet and Swing).	Create	PSO2
CO6	Create the Java event-handling model to respond to events arising from the GUI components	Create	PSO2
CO7	Create database connection in Java	Create	PSO2

UNIT	COURSE DESCRIPTION	Hrs.	CO
1.0	**Brief History of Java**	**12**	
1.1	Features of Java	2	CO1
1.2	JDK,Data Types , Operators	1	CO1
1.3	,Control Structures in JAVA	2	CO2
1.4	Arrays , The JAVA Class , Constructor ,	2	CO2
1.5	Finalizers	2	CO2
1.6	Classes inside Classes.	3	CO2
2.0	**Inheritance, interface**	**10**	

2.1	Inheritance & Interface ,	1	CO3
2.2	Deriving Classes	2	CO3
2.3	Method Overriding	2	CO3
2.4	Method Overloading	2	CO3
2.5	Access Modifiers, Abstract Class and Method	1	CO3
2.6	Interfaces, Packages.	2	CO3
3.0	**Exception Handling**	**12**	
3.1	The Try-Catch Statement ,Catching more than one Exception	3	CO3
3.2	The Finally Clause ,When to use Exceptions	3	CO4
3.3	Threads: Introduction , Creating Treads in Applications	3	CO4
3.4	Methods in Thread Class	3	CO4
4.0	**Java I/O Packages ,**	**14**	
4.1	Java Input Stream Classes	2	CO5
4.2	Java Output ,File Class	2	CO5
4.3	Graphic & Sound: AWT and Swing	2	CO6
4.4	Graphic Methods , Fonts , User interface components with Swing	4	CO6
4.5	Loading and Viewing Images, Loading and Playing Sound, AWT & Event Handling, Layout.	4	CO6
5.0	**Networks & Layer of Networks**	**16**	
5.1	Networks & Layer of Networks , IP Address & Port Numbers	5	CO5
5.2	URLs ,Client/Server Model, Socket Basics	5	CO5
5.3	Server Socket, Applets, JDBC, RMI.	6	CO7

References:

Ken Arnold, James Gosling; The Java Programming Language,Addison-Wesley Second Edition.
Joe Wigglesworth, Paula Lumby: Java Programming Advanced Topics, Thomson Learning
Deitel & Deitel; Java How to Program, Pearson Education
Elliotte Rusty Harold; Java Network Programming, 3RD Edition
Xavier C.; Programming with JAVA 2, SCITECH

COURSE	DETAILS
CODE	BCS504
TITLE	LINUX AND PHP
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/V
TYPE	CORE
CREDITS	3

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand Unix and Linux Operating System	U	3
2	Implement and innovate commands using the basic tool kit.	APPLY	3
3	Execute the Basic Shell Commands	APPLY	3
4	Identify the skills needed for basic administration	R	3
5	Discuss basic concepts of php	U	3

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Overview of Linux**	**14**	
1.1	Overview of Linux, features, advantages	2	1
1.2	Booting process, kernel,	2	1
1.3	simple commands-ls, cd, pwd, cp, mv, rm,rmdir, date	2	2
1.4	file permissions chmod- Editing files using vi editor	2	2
1.5	shell variables-shell types-filters pr, head, tail, cut, paste, sort, grep, pipe, tee-	3	2
1.6	Communication &Scheduling commands- mail, wall, write, talk, at, cron, crontab.	3	2
2.0	**Shell Programming**	**8**	
2.1	Shell Programming-control structures,	4	3
2.2	Operators, simple shell programs.	4	3
3.0	**System Administration**	**18**	
3.1	System Administration-creating and deleting users	2	4
3.2	mounting file systems-mount, umount-	2	4
3.3	changing passwords-passwd-network administration	3	4
3.4	netstat, ping, ifconfig, traceroute-remote login-telnet, ssh, file transfer-ftp	3	4
3.5	process related commands- ps, kill- archiving- tar, gzip,	3	4
3.6	Installation of packages using rpm command	2	4
3.7	Understanding various servers-DHCP, DNS, Apache, squid.	3	4
4.0	Introduction to PHP	14	5
4.1	Introduction to PHP- Advantage, features	2	5
4.2	**PHP syntax-variables-PHP tags and styles -data types,**	**2**	
4.3	variables, operators-type casting- array operators	3	5
4.4	control structures-arrays-sorting arrays	3	5
4.5	file functions-string functions-functions in PHP	4	5
5.0	Object Oriented Concepts in PHP	10	5
5.1	Object Oriented Concepts in PHP - classes, objects,	3	5
5.2	inheritance, overloading and overriding	3	5
5.3	Interfaces-exception handling techniques.	4	5

References:

Linux (Fedora)Bible , Christopher Negus, Wiley India Edition,2007

Linux Administration A beginners guide 2 nd Edition.

Beginning PHP5, Apache, MYSQL, web development Wrox publication

COURSE	DETAILS
CODE	BCS505
TITLE	INTERNET,WEB DESIGNING AND CYBER LAWS
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/V
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the internet, protocols etc	U	1,2
2	Identify various internet services which are widely used	R	1,2
3	Describe facilities for secure communication, electronic commerce and business	R	1,2
4	Explain web programming using html	U	1,2
5	Discuss about the cyber crimes	U	1,2

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Internet-Introduction**	**10**	
1.1	Basic Communication, Local Area Network	2	1
1.2	Packet Switching,Internet:A network of Networks,	2	1
1.3	ISPs and Network Connections,IP address	3	1
1.4	Transmission Control Protocol, Domain Names	3	1
2.0	**Internet Services**	**10**	
2.1	Electronic Mail, Bulletin Board Service(Network News)	2	2
2.2	Browsing the World Wide Web	**2**	2
2.3	Automated web search (Search Engines)	2	2
2.4	Audio and video Communication	2	2
2.5	Faxes and Files(FTP),Remote Login	**2**	**2**
3.0	**Facilities for secure communication**	**8**	
3.1	Facilities for secure communication	4	3
3.2	Electronic commerce and business	4	3
4.0	**Web programming**	**10**	
4.2	Introduction to html,Creating web pages	3	4
4.3	Formatting tags,font,lists,table	3	4
4.4	form,marquee,frame tags, creation of simple web sites	4	4

5.0	**Cyber Crimes**	12	
5.1	Computer crime, Nature of crimes	3	5
5.2	Penalty for damage to computer, computer system	3	5
5.3	Tampering with computer source documents	**2**	**5**
5.4	Hacking, computer related offences,	2	5
5.5	Theft, The language of cyberspace	2	5

COURSE	DETAILS
CODE	BCS504
TITLE	LINUX LAB
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/V
TYPE	CORE PRATICALS
CREDITS	2

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand Linux booting	U	1,2
2	Execute communication and scheduling commands and process relaeted commands	apply	1,2
3	Implement shell programming	apply	1,2
4	Implement system administration and vi editor	apply	1,2
5	Discuss X-windows system concept	U	1,2

MODULE	COURSE DESCRIPTION	HR	CO
1.	Introduction to Linux Booting ,login-simple commands	2	**1**
2	Bash- wild card characters grep-pipe-tee- command substitutions Shell variables subshells export filters pr, head,tail ,cut,paste,sort,uniq,nl.grep,tr,join editors vi and emacs-Communication and scheduling commands mail ,talk,write,wall,at,cron process related commands-ps,kill,nohup,nice,time archievin tar gzip rpm	8	2
3	Shell programming shell variables , read,echo,command line arguments && ,||,if, while case,for, until, test,set,shift , trape	8	3
4	System administration booting ,init,runlevels ,creating users and groups , system databases password ,group ,shadow,init tab ,inetd.conf-startup scrip shutdown mount fsck network administration net stat, ping , traceroute, ifconfig telnet and ftp	6	4
5	X-windows systems concepts ,window managers ,KDE and GNOME setting up servers DHCP DNS NFS-proxy- apache samba	2	5

SEMESTER-VI

COURSE	DETAILS
CODE	BCS601
TITLE	PARALLEL PROCESSING
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/VI
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand parallel processing and its schemes	U	PSO3
2	Explain pipeline and classification of pipeline processors	U	PSO3
3	Know the structure and algorithms for array processors	U	PSO1
4	Learn multiprocessor architecture and programming	U	PSO3
5	Understand data flow in computers	U	PSO2

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Introduction to parallel processing:**	12	1
1.1	Parallelism in uniprocessor systems,	4	1
1.2	parallel computer structures	2	1
1.3	Architectural classification schemes (Flynn's, Fengs and handlers)	4	1
1.4	Parallel processing applications.	2	1
2.0	**Pipelining and vector processing**	16	2
2.1	Linear pipelining	2	2
2.2	classification of pipeline processors,	4	2
2.3	Instruction and arithmetic pipelines	4	2
2.4	principles of designing pipelined processors,	4	2
2.5	characteristics of vector processing	2	2
3.0	**Structures and algorithms for Array processors:**	14	3
3.1	SIMD array processors	4	3
3.2	SIMD interconnection networks,	4	3
3.3	parallel algorithms for array processors	6	3
4.0	**Multiprocessor architecture and programming**	14	4
4.1	functional structures of multiprocessor systems	4	4
4.2	interconnection networks	4	4
4.3	multiprocessor operating systems	4	4
4.4	interprocessor communication mechanisms	2	4
5.0	**Dataflow computers:**	14	5
5.1	Distinction between control flow and data flow computers,	4	5
5.2	Data flow graphs and languages	4	5
5.3	Advantages and disadvantages of dataflow computers	2	5

| 5.4 | Dataflow computer architectures | 4 | 5 |

References:

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

Introduction to Computer Architecture-Stone H S(Galgotia publishers)

The Architecture of pipelined computers-Koggi H(Mc Graw Hill)

COURSE	DETAILS
CODE	BCS602
TITLE	COMPUTER GRAPHICS AND MULTIMEDIA
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/VI
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the basics of computer graphics, different display devices and applications of computer graphics.	U	2
2	Identify the algorithmic development of graphics primitives like: point, line, circle, ellipse etc.	R	2
3	Implement 2D and 3D transformations on graphics objects.	APPLY	2
4	Examine 2D Viewing and different clipping methods.	R	2
5	Understand the concept of multimedia and animation techniques.	U	2

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Overview of Graphics System:**	**12**	
1.1	display devices, raster scan systems, random scan systems	2	1
1.2	input devices, graphics software	2	1
1.3	Output Primitives: points and lines,	2	1
1.4	line drawing algorithms, DDA, Bresenhams line algorithm	3	2
1.5	circle generating algorithms-Bresenhams, Mid-point, Filled area Primitives.	3	2
2.0	**Attributes of Output Primitives:**	**18**	
2.1	Line, Curve, Area fill, Character text, Marker Antialiasing	3	2
2.2	2D Transformations: Basic transformations,	**2**	3
2.3	Matrix representations and Homogeneous co-ordinates	2	3
2.4	Composite transformations, Reflection, Shear	3	3
2.5	2D Viewing: viewing pipeline, window to viewport co-ordinate transformations,	4	4

2.6	Clipping operations, point, line-Cohen Sutherlands	**2**	4
2.7	polygon clipping-Hodgemans, Weilor-Atherton, curve, text	2	4
3.0	**Structures:**	**16**	
3.1	Structures: concepts, basic modeling concepts	2	3
3.2	interactive graphics, logical classification of input devices	3	3
3.3	input functions, interactive picture construction techniques	3	3
3.4	3D Concepts: Introduction to 3D graphics	4	3
3.5	display methods, 3D representations-polygon surfaces	4	3
4.0	**Multimedia**	**16**	
4.1	Definition of Multimedia ; Applications	2	5
4.2	Hardware and Software requirements for creating multimedia	3	5
4.3	Building blocks of multimedia text, graphics(image),video, audio	3	5
4.4	animation ; Different types of animation	3	5
4.5	Brief overview of stages in execution of multimedia project	**2**	5
4.6	Pre-production, production and post-production phases.	3	5
5.0	**Compression**	**12**	
5.1	What is Compression ; Lossy and Lossless compression ; Compression techniques	3	5
5.2	RLE in text and image, LZW, Huffman�s Coding,	3	5
5.3	GIF, JPEG, MPEG, Fractal,Wavelet ; Image Filetypes;	2	5
5.4	Advanced Multimedia Virtual Reality, Augmented Reality,	2	5
5.5	Video Conferencing, Morphing, voIP, Video on Demand	2	5

References:

Computer Graphics, Hearn & Baker-Pearson Prentice Hall, 2005.

Multimedia: Making It Work - Tay Vaughan 5 the Edition Tata Mc Graw Hill

Computer Graphics Principles and Practice- Foley, Van Dam, Feiner, Hughes Pearson education, 2006.

Principles of Interactive Computer Graphics Newman S Sproull (Mc-Graw Hill)

Fundamentals of Multimedia Zinnia Li, Mark S Drew Pearson Education

Multimedia Communications Applications, Networks, Protocols and Standards Fred Halsall Pearson Education.

COURSE	DETAILS
CODE	BCS603
TITLE	CLIENT SERVER COMPUTING
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	III/VI
TYPE	CORE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the basics of client server computing	U	PSO3
2	Learn the hardware and software part of client	U	PSO3
3	Explain the hardware part of server	U	PSO3
4	Know the server requierment	U	PSO1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Overview of C/S Computing**	15	
1.1	Definition, Benefits & Evolution	2	1
1.2	Hardware & Software	2	1
1.3	Trends	2	1
1.4	Evolution of operating systems	2	1
1.5	Networking trends.	1	1
1.6	Overview of C/S applications: components, classes, categories.	1	1
1.7	Overview of C/S computing: Dispelling the Myths	1	1
1.8	Obstacles- Upfront and hidden	1	1
1.9	open systems and standards	1	1
1.10	Standards setting organizations	1	1
1.11	Factors of success	1	1
2.0	**Client hardware and software**	10	
2.1	Client components and operating systems	1	2
2.2	What is GUI?,Xwindow vs. windowing, database access	1	2
2.3	Application logic client software products	1	2
2.4	GUI environments	1	2
2.5	converting 3270/5250 screens,	1	2
2.6	database access tools	1	2
2.7	Client requirements: GUI design standards	1	2
2.8	Open GUI standards	1	2
2.9	Interface dependents, testing interfaces	1	2
2.10	development aides.	1	2
3.0	**Server hardware**	20	
3.1	Benchmarks, categories of servers	2	3
3.2	features and classes of server machines	2	3
3.3	Server Environment: eight layers of softwares	2	3
3.4	network management and computing environments,	4	3
3.5	extensions, network operating systems	2	3

3.6	loadable modules	2	3
3.7	Server operating systems: OS/2	2	3
3.8	Windows new technology,	2	3
3.9	UNIX based operating systems	2	3
4.0	**Server Requirements**	15	
4.1	Platform independence,	1	4
4.2	transaction processing,	1	4
4.3	connectivity, intelligent database	1	4
4.4	stored procedures	1	4
4.5	Triggers, Load Levelling	1	4
4.6	Optimizer, testing and diagnostics tools	1	4
4.7	real ability backup and recovery mechanisms	1	4
4.8	Server data management and access tools:	1	4
4.9	Data manager features	1	4
4.10	data management software	1	4
4.11	database gateways	1	4
4.12	LAN hardware and software	2	4
4.13	Network Operating Systems.	2	4

References:

Dawna Travis Dewire, Client Server Computing, McGraw Hill International

Tanenbaum and Van Steen, Distributed Systems Principles and Paradigms, Pearson Education, 2005

Orfali, Harkey and Edwards, The Essential Client server Survival guide, 2 nd editionGalgotia, 2003

Jeffrey.D.Schan, C/S Application and Architecture, Novell Press, BPB

Joe Salami, Guide to C/S Databases, Bpb Publn., 1994

David Vaskevitch, Client Server Strategies, Galgotia, 1994.

COMPLEMENTARY COURSE

COURSE	DETAILS
CODE	MEC1C01
TITLE	MATHEMATICS I (Vector Analysis, Differential Equation, Fourier series and Integral Transform)
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/I
TYPE	COMPLEMENTARY
INSTRUCTOR(S)	ANSMOL GEORGE
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Evaluate directional derivatives and gradients	E	PSO1
2	Apply Stokes' theorem and Green's theorem to compute line integrals	Apply	PSO1
3	Evaluate ordinary differential equations and partial differential equations including first order and second order'	E	PSO1
4	Evaluate the Fourier transform of elementary functions	U	PSO1
5	Identify appropriate shift theorems in finding laplace and inverse laplace transforms.	APPLY	PSO1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Vector Analysis & Co-ordinate System**	25	1,2
1.1	A quick Review of the basic concepts	5	1,2
1.2	Gradient of a scalar field; Directional Derivative, Divergence of a vector field, Curl of a Vector Field. .	5	1,2
1.3	A quick Review of Line Integrals, Surface Integrals, and Triple Integrals	5	1,2
1.4	Green's Theorem in the Plane, Divergence theorem of Gauss and Stoke's theorem	5	1,2
1.5	Cartesian, Spherical and Cylindrical co-ordinate systems and transformations. Forms of the Gradient, Divergence, Curl and Laplace an operators in the co-ordinate systems	5	1,2
2.0	**Ordinary Differential Equations & Partial Differential Equations**	22	3
2.1	Exact differential equations, homogenous, non-homogeneous, linear and Bernoulli's equations	4	3
2.2	Linear Differential equation of second order with constant coefficients.	4	3
2.3	Simultaneous equations with constant coefficients	4	3

2.4	Laplace's equation, Poisson equation and wave equation	4	3
3.0	**Fourier Series**	**15**	**4**
3.1	Periodic functions	2	4
3.2	Trigonometric series	3	4
3.3	Fourier series	3	4
3.4	Functions of any period	2	4
3.5	Even and odd functions	2	4
3.6	Half range expansions	2	4
4.0	**Integral Transform**	**10**	**5**
4.1	Laplace Transform, inverse Laplace Transform	3	5
4.2	Linearity, shifting, Transforms of derivatives	3	5
4.3	Integrals Solution of differential equations by Laplace Transform	4	5

COURSE	DETAILS
CODE	BCS105
TITLE	Digital Electronics
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/I
TYPE	COMPLEMENTARY
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the concepts of different types of number system and its conversion from one type to another	U	PSO2
2	Describe laws and rules of Boolean algebra and Boolean operations	U	PSO2
3	Understand the logic function	U	PSO2
4	Implementing combinational logic circuits based on counters and flip flop	APPLY	PSO2
5	Explain shift registers	U	PSO2

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Number Systems, Operation and codes**	15	1
1.1	Decimal Number, Binary Numbers: Decimal to binary conversion	2	1
1.2	Binary Arithmetic	2	1
1.3	Ones and twos complement of binary numbers	2	1
1.4	Signed Numbers : Arithmetic operation with signed numbers	2	1
1.5	Hex decimal numbers	1	1
1.6	Octal Numbers	1	1
1.7	Binary Coded Decimal	1	1
1.8	Digital codes	2	1

1.9	Error detection and correction codes.	1	1
1.10	Logic gates: The inverter AND, OR, NOT, XOR, XNOR, NAND	1	1
2.0	**Boolean Algebra and logic Simplification**	10	2
2.1	Law and rules of Boolean algebra	1	2
2.2	De-morgans theorems	1	2
2.3	Simplification of logic expressions using Boolean algebra	1	2
2.4	SOP and POS expressions	1	2
2.5	the Karnaugh map	1	2
2.6	Karnaugh map minimizations.	1	2
2.7	Combinational Logic :- Implementation of a logic circuit from a Boolean expression	1	2
2.8	Implementation of a logic circuit from a truth table	1	2
2.9	Minimizing a logic circuit	1	2
2.10	The Universal property of NAND and NOR gates	1	2
3.0	**Logic Functions**	10	3
3.1	Adders	2	3
3.2	Parallel Binary Adders	1	3
3.3	Comparators	1	3
3.4	Decoders	1	3
3.5	Encoders	2	3
3.6	Code Converters	1	3
3.7	Multiplexers	1	3
3.8	De-multiplexers	1	3
3.9	Parity Generators/Checkers.	2	3
4.0	**Flip Flops**	20	4
4.1	Latches	2	4
4.2	Edge triggered flip flops	1	4
4.3	Master-Slave Flip Flops	2	4
4.4	Flip-Flop Operating Characteristics	2	4
4.5	Flip-Flop Applications	1	4
4.6	Counters :- Asynchronous Counter Operation	2	4
4.7	Synchronous Counter Operation	1	4
4.8	Up/Down Synchronous Counters	2	4
4.9	Design of Synchronous Counters	2	4
4.10	Cascaded Counters	2	4
4.11	Counter Decoding	2	4
4.12	Counter Applications.	2	4
5.0	**Shift Registers**	10	5
5.1	Serial In/Serial Out Shift Registers	2	5
5.2	Serial In/Parallel Out Shift Registers	1	5
5.3	Parallel In/Serial Out Shift Registers	1	5
5.4	Parallel In/Parallel Out Registers	1	5
5.5	Bidirectional Shift Registers	2	5
5.6	Shift Register Counters	2	5
5.7	Shift Register Applications -System Interfacing-ADC-DAC.	1	5

References:

Digital Fundamentals Eighth edition-Floyd and Jain, Pearson education

Digital logic and computer design, Morris Mano PHL

Digital computer fundamentals - Bartee T

COURSE	DETAILS
CODE	MEC2C01
TITLE	MATHEMATICS II (LINEAR ALGEBRA AND GRAPH THEORY)
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/II
TYPE	COMPLEMENTARY
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand the concepts of vector space and its properties	U	PSO1
2	Understand different types of matrices and determine solution of system of equation	U	PSO1
3	Evaluate different matrix operations for analysing data orientation of computers	E	PSO1
4	Understand and analyse different graph theory applications for the better implementation of computer algorithm	U/ ANAL YZE	PSO1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Vector Space**	16	1
1.1	Vector spaces: Definition and examples	4	1
1.2	Linear Independence basis, Orthonormal Basis	4	1
1.3	Linear transformation	4	1
1.4	Matrix via Linear Transformation	4	1
2.0	**Matrices**	20	3
2.1	Symmetric, Skew symmetric, Hermitian and Skew Hermitian matrices	4	2,3
2.2	Adjoint and Inverse of a matrix	6	2,3
2.3	Orthogonal and Unitary matrices, Rank of a matrix	5	2,3
2.4	Elementary transformations of a matrix, reduction to normal and echelon form.	5	2,3
3.0	**Eigen Values & Vectors**	20	2,3
3.1	Consistency and solution of System of linear equations characteristic equation of a matrix,	5	2,3
3.2	Eigen values, Eigen vectors,	5	2,3
3.3	Cayley Hamilton theorems, Nature of Characteristic roots of diagonal	5	2,3
3.4	Hermitian, Skew –Hermitian and unitary matrices	5	2,3
4.0	**Graph Theory**	16	4
4.1	Graph theory terminology, Paths and Circuits	4	4
4.2	Representation of Graphs, Path Matrix, Adjacency matrix,	4	4

	Adjacency matrix.		
4.3	Exterior paths and circuits, Hamiltonian paths and Circuits	4	4
4.4	Spanning tress, Minimum spanning trees.	4	4

COURSE	DETAILS
CODE	BCS204
TITLE	PRINCIPLES OF ELECTRICAL COMMUNICATION
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	I/II
TYPE	COMPLEMENTARY
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Understand And Analyse Principles Of Data And Signals For Better Data Transmission	U	3
2	Analyse Different Transmission Media For Control The Data Communication In Effective Manner	ANLZ	1
3	Summarize Different Analog And Digital Transmissions For Proper Communication	U	2
4	Understand Different Switching Technology And Cable Connection For Communication Implementation	U	1
5	Analyse Different Complete Data Communication Schemes For Better Data Transmission Through Communication Chanel	ANLZ (COMMON)	1

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Data and Signals**	20	1
1.1	Analog and Digital Data, Analog and Digital Signals, Periodic and No periodic, Periodic Analog signals, Signals: - Communication Model. Communication Blocks.	5	1
1.2	Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signals, Bit Rate, Digital Signal as a Composite Analog Signal, Transmission of Digital and Analog Signals	5	1
1.3	Transmission Impairment, Attenuation, Distortion, Noise, Data rate limits, Noiseless channel: Nyquist bit rate	5	1
1.4	Noisy Channel: Shannon Capacity, Simplified Communication & Data Communication models. Data Flow-Simplex, Half Duplex, Full Duplex. Introduction To Signals- Analog And Digital- Periodic And A Periodic. Different Types - Graphical Representation. Frequency Spectrum -Bandwidth- Simple	5	1
2.0	**Transmission Media**	10	2
2.1	Guided media, Twisted-pair cable – UTP, STP, Connectors	5	2

		Coaxial Cable, Connectors Fiber-Optic Cable Media: Different Types- Guided And Unguided-Physical Description And Characteristics Of Twisted Pair Cables, Coaxial Cables And OFCs		
2.2		Propagation Modes, Unguided Media - Wireless Transmission – Terrestrial Microwave, Satellite Microwave, Radio Waves. Infrared. Noise - Transmission Impairments- Channel Capacity- SNR- Wireless Transmission-Satellite Communication- IR Transmission.	5	2
3.0		**Digital Transmission**	15	3
3.1		Analog to Digital Conversion: Block Diagram of Digital Communication System. Parallel and serial ports	5	3
3.2		Pulse Code Modulation(PCM), Sampling, Sampling Rate, Quantization, Delta modulation, Adaptive Delta Modulation	5	3
3.3		Transmission modes, Parallel Transmission, Serial Transmission, Asynchronous Transmission, Synchronous Transmission Communications: - PCM, DPCM, DM, ADM, Concept Of FDM And TDM.	5	3
4.0		**Analog Transmission**	15	3
4.1		Digital to Analog Conversation, Modulation of Digital Data, Bit Rate, Baud Rate, Carrier signal	2	3
4.2		ASK, FSK, PSK, AND QAM. Analog to Analog modulation, Amplitude Modulation, Frequency Modulation Modulation and Demodulation: - Modulation- Introduction AM, FM, PM- DSB, and SSB. Vestigial Sideband Modulation- Analysis Of AM, FM, PM Waves- Generation of AM Waves, Filter System- Phase Shift Method- Third Method- Generation Of FM- FM Methods- Direct Method- AFC- Indirect Method? Demodulators- AM And FMAM Receivers- FM Receivers- Comparison Of AM And FM.	5	3
4.3		Phase Modulation. Bandwidth Utilization : Multiplexing and Spectrum Spreading : Multiplexing	3	3
4.4		FDM, WDM, TDM, Synchronous TDM, Digital Signal Services, Statistical TDM, Spread Spectrum, FHSS, DSSS Digital Communication: - Introduction- Sampling- Quantization- Commanding- Nyquist Criteria- Pulse Modulation- Digital	5	3
5.0		**Switching**	15	5
5.1		Circuit-Switched Networks, Three Phases, Packet Switching, Datagram Networks	1	5
5.2		Three Phases, Connection Oriented and Connectionless Services.	3	5
5.3		Telephone Network :Major Components, Local Loops, Trunks, Switching Offices	3	5
5.4		Dial-Up service, Digital Subscriber Line,	3	5
5.5		Virtual-Circuit networks, HFC Network, Cable TV for data transfer	3	5
5.6		Cable Networks, Traditional Cable Networks Digital Modulation Techniques: - ASK, FSK, PSK, BPSK, QPSK, and BFSK.	2	5

References:

Electronic Communication Systems, Kennedy and Davis

Principles of Communication Systems, Taub and Schilling

Data & Computer Communications, William Stallings

Data Communication and Networking, Behrouz A Forouzan

COURSE	DETAILS
CODE	BCS301
TITLE	PROBBABILITY AND STATISTICS
DEGREE	B.Sc.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/III
TYPE	COMPLEMENTARY
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	UNDERSTAND THE COCEPTS OF POPULATION AND SAMPLE	U	PSO5
2	RECOGNISE CENTRAL TENDENCY AND VARIOUS MEASURES OF CENTRAL TENDENCY AND DISPERSION	R	PSO5
3	EVALUATE CORELATION AND REGRESSION COIFFICENTS	E	PSO5
4	EVALUATE PROBABILITIES AND CONDITIONAL PROBABILITIES	E	PSO5
5	APPLY PROBLRM SOLVING TECHNIQUES TO SOLIVING REAL WORLD EVENTS	APPLY	PSO5
6	EVALUATE EXPECTATIONS OF RANDOM SAMPLES	E	PSO5
7	APPLY SELECTED PROBABILITY DISTRIBUTIONS TO SOLVE PROBLEMS.	APPLY	PSO5
8	DEVELOP PROBLEM SOLVING TECHNIQUES NEEDED TO ACCURATELY CALCULATE PROBABILITIES	ANALYZE	PSO5
9	UNDERSTAND CENTRAL LIMILT THEOREM AND ITS APPLICATIONS	U	PSO5
10	UNDERSTAND CHYPOTHESIS TESTIG AS MAKING ARGUMENTS	U	PSO5

MODULE	COURSE DESCRIPTION	HR	CO
1.0		18	1,2,3
1.1	Introduction to Statistics, Basic concepts, population and sample, Collection of data, census and sampling. Methods of sampling-Random and Non Random sampling methods	2	1
1.2	Frequency distributions-Measures of central tendency	4	2
1.3	Measures of dispersion, moments, skewness and kurtosis.	4	2
1.4	Correlation and Regression analysis-Types of correlations	4	3
1.5	Methods of studying simple correlation, properties of correlation coefficient.	4	3
2.0		18	4,5
2.1	Different approaches to probability, conditional probability, Independence of events	4	4
2.2	Addition and multiplication theorems,.	5	4
2.3	Bayes theorem, simple problems	5	5
2.4	Random variables and probability distributions-discrete and continuous.-distribution function and its properties. Extension to bivariate case	4	5
3.0		18	6,7,8
3.1	Expectation and its properties., Mean variance and moments in terms of expectation	3	6
3.2	Moment generating function and characteristic function-simple problems	4	6
3.3	Standard probability distributions-Binomial, Poisson, Uniform and Normal distributions	6	7,8
3.4	Problems relating to practical applications	5	7,8
4.0		18	7,8,9,10
4.1	Central Limit theorem[without proof] and its applications	3	9
4.2	Sampling distributions –Definition, parameter, statistic, Standard error[concept only]	3	7,8

4.3	sampling distribution of the sample mean, t,X2 and F statistic definition and properties	5	7
4.4	Estimation –Concept of Point and Interval estimation –Point estimate and its properties	3	10
4.5	Test of significance-Elementary ideas and simple problems.	4	8,10

COURSE	DETAILS
CODE	BCS402
TITLE	MICROPROCESSORS AND ASSEMBLY LANGUAGE PROGRAMMING
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/IV
TYPE	COMPLEMENTARY
CREDITS	4

CO NO.	COURSE OUTCOME	CL	PSO
1	Learn 8085architecture and programming in assembly language	U	PSO3
2	Understand the basic concepts of interfacing memory and peripheral devices to a microprocessor	U	PSO3
3	Know the procedures and operations in 8086	U	PSO3
4	Explain various advanced processor architectures	U	PSO3
5	Explain 80286 microprocessor	U	PSO3

MODULE	COURSE DESCRIPTION	HR	CO
1.0	**Microprocessor architecture and its operations**	10	1
1.1	Microprocessor initiated operations and 8085 bus organization	2	1
1.2	Internal data operations	1	1
1.3	8085 registers, externally initiated operations	2	1
1.4	Memory – memory map	1	1
1.5	Memory and instructions	1	1
1.6	Peripheral mapped I/O	1	1
1.7	8085 Microprocessor and its architecture	2	1
2.0	**8086 Internal architecture**	16	2
2.1	Basic 8086 microcomputer system, system overview	2	2
2.2	8086 bus	1	2
2.3	Read machine cycle, Write machine cycle	1	2
2.4	Assembly language programming-program development steps	1	2

2.5	8086 instructions – data transfer instructions, arithmetic instructions, bit manipulation instructions, string instructions, program execution.	2	2
2.6	Constructing the machine codes for 8086 instructions	1	2
2.7	Implementing standard program in 8086	1	2
2.8	unconditional jump instructions	1	2
2.9	condition flags	1	2
2.10	conditional jump instructions	1	2
2.11	If-then, If-then else, and multiple if-then-else, while-do	1	2
2.12	Repeat-until	1	2
2.12	loop instructions	1	2
2.13	Instruction timing and delay loops.	1	2
3.0	**Strings, Procedures and Macros**	14	3
3.1	8086 string instructions,	2	3
3.2	Writing and using procedures	2	3
3.3	CALL and RET instructions	2	3
3.4	Stack	2	3
3.5	Using PUSH and POP to save register contents	2	3
3.6	Passing parameters	1	3
3.7	Re-entrant and recursive procedures	2	3
3.8	writing and using macros.	1	3
4.0	**8086 interrupts**	14	4
4.1	8086 interrupts-program examples	2	4
4.2	Interrupt Types	1	4
4.3	8254 software	2	4
4.4	Programmable TIMER/ COUNTER	2	4
4.5	Basic 8253 and 8254 operations	1	4
4.6	8255A, 8259A Priority interrupt controller	2	4
4.7	Direct Memory Access data transfer	1	4
4.8	circuit connections and operations of the Intel 8257 DMA controller	2	4
4.9	DMA transfer timing diagram.	1	
5.0	**Intel 80286 microprocessor**	10	5
5.1	Architecture, signals and system connections	2	5
5.2	Real address mode operation, protected mode operation	2	5
5.3	Intel 80386 32-bit microprocessor – architecture, pins and signals	2	5
5.4	Introduction to 80486 microprocessor	2	5
5.5	Introduction to RISC machines.	2	5

References:

Microprocessors and Interfacing, Programming and Hardware, Douglas V- Hall. Tata McGraw-Hill.

Architecture, Programming and Interfacing - Barry B.BreyPrentice Hall India.

Microprocessor 8086 programming & interfacing, A.nagoor Kani. RBA publications.

The Intel Microprocessors 8086 / 8088, 80186 / 80188 , 80286 , 80386 , 80486 , Pentium, and Pentium Pro processor

COURSE	DETAILS
CODE	BCS405
TITLE	ASSEMBLY LANGUAGE PROGRAMMING LAB
DEGREE	B.SC.
BRANCH	COMPUTER SCIENCE
YEAR/SEMESTER	II/IV
TYPE	COMPLEMENTARY PRACTICALS
CREDITS	2

CO NO.	COURSE OUTCOME	CL	PSO
1	Learn assembling and disassembling of PC	U	PSO1
2	Experience with Assembly Language programming	U	PSO1
3	Study interfacing of peripheral devices with8086 microprocessor.	U	PSO3
4	Understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors.	U	PSO1
5	Learn fundamentals of designing embedded systems	U	PSO5

MODULE	COURSE DESCRIPTION	HR	CO
1	Simple Arithmetic Calculations	2	1,2
2	Conditional Statements	2	3,4
3	Control Statements	2	3,4
4	Loop and Arrays	2	4
5	Character Strings	2	3,4
6	Subroutines and Stack Operations	2	1,2,5