SYLLABUS

FOR

Bachelor of Science (Hons.)
Computer Science

Effective from Academic Session
2018-2019

SHRI GURU RAM RAI UNIVERSITY
DEHRADUN

Programme Structure

Bachelor of Science (Hons) Computer Science

FIRST SEMESTER:

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-101	Computer Fundamentals and Programming in C	4	-	-	10	20	30	70	100	4
2.	BCS-102	Digital Electronics	4	1	-	10	20	30	70	100	5
3.	BCS-AEC1	English Communication	2	-	-	10	20	30	70	100	2
4.	BCS-GE1	Generic Elective-I	4	1	-	10	20	30	70	100	5
Practical											
1.	BCS-P11	Programming in 'C' Lab	-	-	4	30	-	30	70	100	2
2.	BCS-P12	Digital Electronics Lab	-	-	4	30	-	30	70	100	2
Total			**14**	**2**	**8**	**100**	**80**	**180**	**420**	**600**	**20**

SECOND SEMESTER:

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-201	Data Structures Using C	4	1	-	10	20	30	70	100	5
2.	BCS-202	Operating System	4	1	-	10	20	30	70	100	5
3.	BCS-AEC2	Environment Studies	2	-	-	10	20	30	70	100	2
4.	BCS- GE2	Generic Elective-II	4	-	-	10	20	30	70	100	4
Practical											
1.	BCS-P21	Data Structure Lab	-	-	4	30	-	30	70	100	2
2.	BCS-P22	Unix Lab	-	-	4	30	-	30	70	100	2
Total			**14**	**2**	**8**	**100**	**80**	**180**	**420**	**600**	**20**

TA : Teacher Assessment CT : Class Test ESE : End Semester Examination SUB TOT. : Subject Total TOT. : Total

THIRD SEMESTER:

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-301	Programming in JAVA	4	-	-	10	20	30	70	100	4
2.	BCS-302	Computer Networks	4	-	-	10	20	30	70	100	4
3.	BCS-SEC1	SEC1	4	-	-	10	20	30	70	100	4
4.	BCS-GE3	Generic Elective-III	4	-	-	10	20	30	70	100	4
Practical											
1.	BCS-P31	Java Lab	-	-	4	30	-	30	70	100	2
2.	BCS-P32	Networking Lab	-	-	4	30	-	30	70	100	2
Total			**16**	**-**	**8**	**100**	**80**	**180**	**420**	**600**	**20**

FOURTH SEMESTER:

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-401	DBMS	4	-	-	10	20	30	70	100	4
2.	BCS-402	Software Engineering	4	-	-	10	20	30	70	100	4
3.	BCS-SEC2	SEC2	4	-	-	10	20	30	70	100	4
4.	BCS-GE4	Generic Elective-IV	4	-	-	10	20	30	70	100	4
Practical											
1.	BCS-P41	DBMS Lab	-	-	4	30	-	30	70	100	2
2.	BCS-P42	SEC2 Lab	-	-	4	30	-	30	70	100	2
Total			**16**	**-**	**8**	**100**	**80**	**180**	**420**	**600**	**20**

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FIFTH SEMESTER:

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-501	Web Technology	4	-	-	10	20	30	70	100	4
2.	BCS-502	. Net Programming	4	-	-	10	20	30	70	100	4
3.	BCS-DSE1	DSE1	4	-	-	10	20	30	70	100	4
4.	BCS-DSE2	DSE2	4	-	-	10	20	30	70	100	4
Practical											
1.	BCS-P51	Web Technology Lab	-	-	4	30	-	30	70	100	2
2.	BCS-P52	C#.Net Lab	-	-	4	30	-	30	70	100	2
Total			**16**	**-**	**8**	**100**	**80**	**180**	**420**	**600**	**20**

SIXTH SEMESTER:

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-601	Computer Graphics	4	-	-	10	20	30	70	100	4
2.	BCS-DSE3	DSE3	4	1	-	10	20	30	70	100	5
3.	BCS-DSE4	DSE4	4	1	-	10	20	30	70	100	5
Practical											
2.	BCS-P61	DSE3 Lab	-	-	4	30	-	30	70	100	2
3.	BCS-P62	Project	-	-	4	30	-	30	70	100	2
	BCS-SM	Seminar	-	-	4	100	-	100	-	100	2
Total			**12**	**2**	**12**	**190**	**60**	**250**	**350**	**600**	**20**

TA : Teacher Assessment CT : Class Test ESE : End Semester Examination SUB TOT. : Subject Total TOT. : Total

Generic Electives (Other Discipline) GE1 to GE5

1. Statistics
2. Operations Research
3. Economics
4. Organizational Behavior
5. Consumer Affairs

Skill Enhancement Courses

SEC1 (Choose One)

SEC1.1	Computer Organization
SEC1.2	Introduction to Logic
SEC1.3	Multimedia Systems
SEC1.4	System Analysis & Design

SEC2(Choose One)

SEC2.1	Object Oriented Programming using C++
SEC2.2	Programming in Python
SEC2.3	R Programming
SEC2.4	PERL/ CGI

Discipline Specific Elective Papers

DSE 1 (Choose One)

DSE1.1	Theory of Computation
DSE1.2	Microprocessor Systems
DSE1.3	Analysis and Design of Algorithms
DSE1.4	Graph Theory

DSE 3 (Choose One)

DSE3.1	Advanced Java
DSE3.2	ASP.NET
DSE3.3	Android Programming

DSE 2 (Choose One)

DSE2.1	Cryptography and Network Security
DSE2.2	Cloud Computing
DSE2.3	Mobile Computing
DSE2.4	Data warehousing and Data mining

DSE 4 (Choose One)

DSE4.1	Design of Compilers
DSE4.2	Advanced DBMS
DSE4.3	Advanced Computer Networks
DSE4.4	Artificial Intelligence

FIRST SEMESTER

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-101	Computer Fundamentals and Programming in C	4	0	4	10	20	30	70	100	4/2

BCS-101 COMPUTER FUNDAMENTALSAND PROGRAMMING IN C

Generation of Computer, Hardware Components, Primary Memory-RAM, ROM, Secondary Storage Devices; Input Devices, Output Devices, CPU- Arithmetic Logic Unit, Control Unit, Registers, Cache Memory.
System software, Application Software, Elementary commands of DOS.

Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programms. Debugging Techniques,

Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation. Control Statements: if-else, switch, break, continue, the comma operator, go to statement. Loops: for, while, do-while

Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifile programs.

Arrays: Linear arrays, multidimensional arrays, Passing arrays to functions, Arrays and strings.
Structure and Union: Definition and differences, self-referential structure. And address of (&) operator, pointer to pointer, Dynamic Memory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.

File: File Handling in C

TEXT BOOKS:

1. Raja Raman V: Fundamentals of Computers
2. Sanders D.H: Computers Today
3. Gottfried, "Programming in C, Schaum's Series Tata McGraw Hill

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BCS-102	Digital Electronics	4	1	4	10	20	30	70	100	5/2

BCS-102 DIGITAL ELECTRONICS

UNIT 1

Number Systems: Binary, Decimal, Octal, Hexadecimal, Conversion from One Number System to another, Character Codes (BCD), Excess-3, Gray Code, ASCII, 1's Complement Representation, 2's Complement Representation
Logic Gates: AND, OR, NOT, XOR, XNOR, NAND and NOR as Universal Gates
Logic Families: Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOSFET Logic, TTL Gates

UNIT 2

Boolean Algebra: Boolean postulates and laws , De Morgan's Theorem, Principle of Duality, Boolean expression, Boolean function, Minimization of Boolean expressions, Sum of Products (SOP), Product of Sums (POS), Minterm-Maxterm, Canonical forms , Karnaugh map Simplification-Don't care conditions.

UNIT 3

Combinational Circuits: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Serial Adder/Subtractor, Parallel Adder/ Subtractor, BCD Adder/Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer

UNIT 4

Sequential Circuits: Latch, Flip Flops- SR, JK, Data, Toggle, Counters- Synchronous and Asynchronous, Registers- Serial-in-Parallel-out, Parallel-in-Serial-Out, Parallel-in-Parallel-out, Applications of Flip Flops

TEXT BOOKS:

1. M. Morris Mano, Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education(Singapore) Pvt. Ltd., New Delhi, 2003
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas publishing house, New Delhi,2002
3. Zaky&Hamacher, "Computer Organization: McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization" New Age
5. Tannenbaum, "Structured Computer Organization" PHI.

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
3.	BCS-AEC1	English Communication	2	-	-	10	20	30	70	100	2

BCS-AEC1 ENGLISH COMMUNICATION

UNIT 1 Elementary English

Grammar: Parts of Speech, Tenses, Short responses, Active and Passive Voice
Vocabulary: Idioms and Phrases, Antonyms, Synonyms, One word substitution
Writing skills: Formal and Informal Letters

UNIT 2 Employability skills

Communication: Types, Objectives, Formal and Informal Communication, Barriers to communication, Selection of appropriate communication medium, Verbal and Non- verbal Communication
Soft Skills: Public Speaking, Presentation Skills, Speech, Debates, Emotion Management

UNIT 3 Career Skills

Interviews, CV Preparation, Group discussion, Personality Development

TEXT BOOKS:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Bussiness Communication: Rajender Paul

SECOND SEMESTER

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-201	Data Structures Using C	4	1	4	10	20	30	70	100	5/2

BCS-201 DATA STRUCTURES USING C

Arrays
Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)

Stacks
Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack

Queues
Array and Linked representation of Queue, De-queue, Priority Queues

Linked Lists
Representation and implementation of Singly linked lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List of Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

Recursion
Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

Trees
Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion , Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).

Searching and Sorting
Sorting, Searching and Hashing: Selection sort, Insertion Sort, Bubble sorting, Quick Sort, Merge Sort Sequential and Binary searching, comparison and analysis of sorting and searching techniques.

Hashing
Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collusion by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function

TEXT BOOKS:

1. Horowitz and Sahani, "Fundamentals of data Structures" Galgotia
2. R. Kruse etal, "Data Structures and Program Design in C" Person Education
3. A.M. Tenenbaumetal, "Data Structures and Program Design in C" Person Education
4. Lipschutz, "Data Structure", TMH
5. K Loudon, "Mastering Algorithms With C", Shroff Publishers and Distributors

S.No	Course No.	Subject	Evaluation – Scheme								Theory/Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BCS-202	Operating System	4	1	4	10	20	30	70	100	5/2

BCS-202 OPERATING SYSTEM

UNIT 1

Introduction: Operating System- Definition, Types of OS- Simple batch system, Time sharing systems, Real time systems, Multiprocessor systems, Distributed systems, System components - OS Services, System Calls.

UNIT 2

Process concepts: PCB, Process Scheduling, Operations on Processes , Co-operating process , IPC , Threads- Overview, Benefits, User & Kernel Threads.
CPU Scheduling:, Scheduling criteria , Preemptive & Non-preemptive scheduling, Scheduling algorithms

UNIT 3

Process Synchronization: Background, Critical Section problem, Critical Regions, Synchronization hardware, Semaphores, Classic Problems of Synchronization
Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention , Deadlock Avoidance , Deadlock Detection and Recovery from Deadlock.

UNIT 4

Memory Management: Logical vs. Physical address space, Swapping, Contiguous memory allocation, Non-Contiguous memory allocation- Paging, Segmentation, Segmentation with paging.
Virtual Memory: Background, Demand paging - Performance, Page replacement, Page replacement algorithms (FCFS, LRU), Allocation of frames, Thrashing.

UNIT 5

File Systems: File concept, access methods, Allocation methods-contiguous, linked and index allocation, Directory System – single level, tree structured, acyclic graph and general graph directory, File protection.
Disk Management: Secondary storage structure: Disk structures, Disk Scheduling, Disk reliability.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin & Greg Gagne , “Operating System Concepts”, Sixth Edition, John Wiley & Sons, Inc.
2. MilankovicM “Operating System concepts and Design”, 2nd edition, Tata Mcgraw hill.
3. Deitel H.M. “An Introduction to Operating Sysems” ,2nd edition, Pearson Education.

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
3.	BCS-AEC2	Environmental Studies	2	-	-	10	20	30	70	100	2

BCS-AEC2 ENVIRONMENTAL STUDIES

UNIT 1: Introduction to environmental studies and Ecosystems

Definition of environment Multidisciplinary nature of environmental studies;, Scope and importance; Concept of sustainability and sustainable development.
What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

UNIT 2: Natural Resources

Natural resources and their type Land resources and land use change; Land degradation, soil erosion and desertification, Deforestation: Causes and impacts due to mining, dam building on environmentWater : Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state)., Energy resources : Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

UNIT 3: Environmental Pollution and Environmental Laws

Environmental pollution: types, causes, effects and controls; Nuclear hazards and human health risks, Solid waste management: Control measures of urban and industrial waste, Pollution case studies.
Climate change, global warming, greenhouse effect ozone layer depletion, acid rain and impacts on human communities and agriculture
Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)

UNIT 4: Biodiversity and Conservation&Human Communities and the Environment

Definition of biodiversity Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons;Disaster management: floods, earthquake, cyclones and landslides, Environmental movements:Chipko, Silent valley, Bishnois of Rajasthan., Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.Case studies (e.g., CNG vehicles in Delhi).

Field 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, Delhi Ridge, etc.

TEXT BOOKS:

1. Carson, R. 2002. Silent Spring.Houghton Mifflin Harcourt.
2. Gadgil, M., &Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.

THIRD SEMESTER

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-301	Programming in Java	4	-	4	10	20	30	70	100	4/2

BCS-301 PROGRAMMING IN JAVA

UNIT 1

Java Programming: Introduction, Operator, Data types, Variables, Methods and Classes, Multi threaded programming,

UNIT 2

I/O Java applet. Java Library: String handling, I/O exploring JAVA, Networking, Applet Classes, Event Handling

UNIT 3

Introduction to AWT, Working with windows, Graphics, AWT Controls, Layout manager and menu, Images, Additional Packages.

UNIT 4

Software Development Using Java: Java Bean, Java Swing, Java Servlets, Migrating from C++ to Java, Application of JAVA, Dynamic Billboard Applet. Image Menu: An image based menu.

TEXT BOOKS:

1. Naughton, Schidt, "The Complete Reference JAVA2", TMH
2. Balagurusamy E, "Programming in JAVA, TMH
3. Dustin R. Calway, "Inside Serviets" Addison Wesley
4. Mark Wutica, "Java Enterprise Edition" QUE
5. Steven Hoizner, "Java2 Black book" Dreamtech

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BCS-302	Computer Networks	4	-	4	10	20	30	70	100	4/2

BCS-302 COMPUTER NETWORKS

UNIT 1

Overview of Networking: Introduction;Need of Networking; Elements of Network; Modes of communication, topology, categories of network (LAN, MAN,WAN); Reference models: OSI reference model, TCP/IP reference model, ISDN.
Physical Layer: Overview of analog & digital signals, transmission media (guided & unguided); TDM, FDM, WDM; Circuit switching: time division & space division switch, Telephone network.

UNIT 2

Data link layer: Framing(character and bit stuffing), Types of errors ,error detection & correction methods; Flow control: Protocols: Stop & wait ARQ, Sliding Window Protocols HDLC;
Medium access sub layer: Channel Allocation, LAN Protocols, FDM, TDM, CSMA/CD/CA, ALOHA protocols, Overview of IEEE standards, IEEE802.3 Ethernet, IEEE 802.11, IEEE 802.15.1

UNIT 3

Network layer: Internetworking devices, Routing: techniques, static vs. dynamic routing; Routing algorithms: flooding, distance vector routing, link state routing; Protocols: ARP, RARP, ICMP; IP Addressing: classful address, subnetting ; IPv4 and datagram, IPv6; Congestion control algorithms

UNIT 4

Transport layer: Design issues, Connection management, TCP window Management, Port No., Socket Address, User Datagram Protocol, Transmission Control Protocol.

UNIT 5

Application layer: DNS; E-mail, SMTP, FTP, POP, SNMP, , TFTP,HTTP; Introduction to Network Security: Symmetric and Asymmetric Cryptography

TEXT BOOKS:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.) “ – TMH
2. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
3. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
3.	BCS-SEC1	SEC1	4	-	-	10	20	30	70	100	4

BCS-SEC1.1COMPUTER ORGANIZATION

UNIT 1

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, ArithmeticLogic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast adders, Arithmetic Algorithms(addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

UNIT 2

Control Design: Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (RegisterTransfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a wordin memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control,Micro programmed control(Microinstruction, Microprogram sequencing, Wide-Branch addressing,Microinstruction with Next-address field, Prefetching Microinstruction).

UNIT 3

Processor Design: Processor Organization: General register organization, Stack organization,addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced InstructionSet Computer.
Input-Output Organization: I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

UNIT 4

Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2Dand 21/2D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

TEXT BOOKS:

1. Computer System Architecture, PHI/Pearson Education, 3rd Edition, M. Morris Mano
2. Digital Computer Fundamentals , Tata McGraw Hill, 6th Edition, Thomas C. Bartee

BCS-SEC1.2 INTRODUCTION TO LOGIC

UNIT 1

Introduction: logic, truth tables, equivalence, language to logic, applications to circuit design, exponential growth, Semantic Tableaux, problem solving with semantic Tableaux.

UNIT 2

Propositional logic: Syntax of propositional logic, rules of natural deduction, the sequent calculus, resolution in propositional logic: Normal forms, Resolving arguments, Resolution, Combinatorial search problems.

UNIT 3

Predicate Logic: Introduction, objects, predicates and quantifiers, functions, first order languages, quantifiers, scope, and binding, Interpretations, higher order logic, semantic tableaux in predicate logic.

UNIT 4

Resolution in Predicate Logic: Normal Forms, Herbrand Universes, Resolution, Unification, Problem solving using resolution

TEXT BOOKS:

1. The Essence of Logic. John Kelly. Prentice-Hall International
2. Virginia Klenk, Understanding Symbolic Logic, 5/e, Pearson Education

BCS-SEC1.3 MULTIMEDIA SYSTEMS

UNIT 1

Introduction to Multimedia, Applications of Multimedia, Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software, Authoring Tools, MIDI

UNIT 2

Multimedia Building Blocks- Text, Image, Sound, Video, Animation

UNIT 3
Sound, Analog and Digital Audio, Sampling, Audio File Formats, Conversion from Analog to Digital Audio

UNIT 4

Bitmap and Vector Images Image standards and classifications, Image File Formats , Image Compression for JPEG, GIF, and PNG, Lossy ad Lossless Compression for Images and Audio, Animation Concepts and Techniques, Computer Animation, Video capture and representation, and Database.Content based retrieval for text and images, Video Video representation, Colors, Video Compression, MPEG standards, MHEG Standard, Video File Formats

UNIT 5

Recent developments in Multimedia, Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Content Based Retrieval

TEXT BOOKS:

1. Buford “Multimedia Systems” Addison Wesley.
2. Agrawal&Tiwari “Multimedia Systems” Excel.

BCS-SEC1.4 SYSTEM ANALYSIS & DESIGN

UNIT I System and Its Components

what is system?, Elements of a system, Type of system, Computer based Information System, System Analysis and Design; **SYSTEM ANALYST:** Roles of system Analyst, Duties of a System Analysts, Qualities of System Analysts , Skills of System Analyst

UNIT II System Development Life Cycle

Need of software life cycle model, Waterfall Model, Feasibility Study, Cost and Benefits; **FACT - FINDING TECHNIQUES:** Record Inspection, On-site observation, Questionnaires, Interviews.

UNIT III Planning Software Project

Planning Phase-Dependent Tools and Techniques: GANNT Chart, PERT Chart. Software Cost Estimation Techniques.

UNIT IV Structured Analysis

Data Flow Diagram, Data Dictionary. Process Specification Tools: Structured English, Decision Tables, Decision Trees.

UNIT V Input-Output Design

Output Design: Types of output, Principles of Output Design, Output Design Process; **Report Design:** Type of reports, Importance of Reports, Criteria for Report Design; **Input Design:** Principles of Input Design, Input Design Process, GUI Controls for Inputs, Importance of Form, Criteria for Form Design.

UNIT VI Testing & Implementation

Objectives of Testing, Test Information Flow, Test Case Design, Types of Test Data, Levels of Testing, Quality Assurance, Quality Software Specifications.Types of implementation, Activities in Implementation, Conversion: Parallel Conversion, Direct Cutover, Location Conversion, Phase – In – Method; Training

Reference Books:

1. V.Rajaraman, “Analysis and Design of Information Systems”, 2nd Edition, Prentice Hall of India
2. K.E. Kendall and J.E.Kendall, “Systems Analysis and Design”, 5th Edition, Pearson Education Asia.
3. J.A.Hoffer, J.F.George, J.S.Velacich, “Modern Systems Analysis and Design”, Third Edition, Pearson Education Asia

FOURTH SEMESTER

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-401	DBMS	4	-	4	10	20	30	70	100	4/2

BCS-401 DATA BASE MANAGEMENT SYSTEM

UNIT 1

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DMI, Overall Database structure. Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation,

UNIT 2

Relational Data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, constraints, relational algebra, relational calculus, tuple and domain calculus.

UNIT 3

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joints

UNIT 4

Database Design & Normalization: Functional dependencies, normal forms, first, second third normal forms, BCNF, Multivalued Dependencies, 4NF, 5NF.

TEXT BOOKS:

1. Date C.J. "An Introduction to Database System". Addision Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts" McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems" Addision Wesley
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Pub.

S.No	Course No.	Subject	Evaluation – Scheme								Theory/Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BCS-402	Software Engineering	4	-	-	10	20	30	70	100	4

BCS-402 SOFTWARE ENGINEERING

UNIT1

Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC)
Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT 2

Software Requirement Specifications (SRS) : Requirement Engineering Process- Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT 3

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

UNIT 4

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of products. Static Testing Strategies: Formal Technical, Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

UNIT 5

Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities.
An Overview of CASE Tools.Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

TEXT BOOKS:

1. Pressman, Roger S., "Software Engineering: A Practitioner's Approach Ed.Boston: McGraw Hill, 2001
2. Jalote, Pankaj, "Software Engineering Ed.2"New Delhi: Narosa 2002
3. Schaum's Series, "Software Engineering" TMH
4. Ghezzi Carlo and Others "Fundamentals of Software Engineering" PHI

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
3.	BCS-SEC2	SEC2	4	-	4	10	20	30	70	100	4/2

BCS-SEC2.1 OBJECT ORIENTED PROGRAMMING USING 'C++'

Introduction: Introduction to OOP, Basic Concepts of OOP, Applications of OOP. Introduction to C++, Introduction to C++ stream I/O, declarations in C++, Creating New data types in C++, function Prototypes, Inline functions, Reference Parameters, Const Qualifier, Dynamic memory allocation, default arguments, Unary Scope resolution operator, Linkage specifications.

Class, Constructors, Friend Class : Introduction, Comparing class with Structure, Class Scope, Accessing Members of a class, Constructor, Destructor, Const objects, Const member functions, Friend class, Friend function, This pointer, Data abstraction and Information hiding, container classes and Iterators

Overloading & Inheritance: Operator Overloading, Fundamentals, Restrictions, Overloading stream, Insertion and stream extraction operators, Overloading unary & binary operators, Converting between types, Overloading ++ and --.

Inheritance, Introduction, Protected members, Casting base _class pointers to derived _class pointers Overloading Base class members in a Derived class, Public, Protocols and Private inheritance, Direct base classes and Indirect Base Classes, Using Constructors and Destructors in Derived classes, Implicit Derived class object to base class object conversion.

Virtual Functions: Introduction, Type fields and switch statements, Virtual functions, Abstract base classes and concrete classes, Polymorphism, Dynamic binding, Virtual destructors. C++ Stream I/O: Streams, Stream Input, Stream Output, Unformatted I/O, Stream manipulators, Stream format states, Stream error, States.
Files : File Operations –File pointers – error Handling during file Operations

TEXT BOOKS:

1. Herbert Scheldt, "Complete Reference".
2. E. Balagurusamy "Object Oriented Programming with C++".
3. YashwantKanetkar, "Let Us C++".
4. C++ Programming by Herbert Scheldt – 2004.

BCS-SEC2.2 PROGRAMMING IN PYTHON

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.
Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Overview of Programming : Structure of a Python Program, Elements of Python

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

CreatingPython Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass), Defining Functions, default arguments, Errors and Exceptions.

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions,Multiple assignment, The while statement, Tables, Two-dimensional tables, Strings andLists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, Listvalues, Accessing elements, List length, List membership, Lists and for loops, Listoperations, List deletion. Cloning lists, Nested lists.
Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries.Data Structures: Arrays, list, set, stacks and queues.

Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion sorting.

Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

Object Oriented Programming: Introduction to Classes, Objects and Methods,Standard Libraries.
Data Structures: Arrays, list, set, stacks and queues.
Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertionsorting.

TEXT BOOKS& REFERENCES:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. How to think like a computer scientist : learning with Python / Allen Downey, Jeffrey Elkner, Chris Meyers. 1st Edition – Freely available online.2012
3. http://docs.python.org/3/tutorial/index.html
4. http://interactivepython.org/courselib/static/pythonds

BCS-SEC2.3 R- PROGRAMMING

Introduction: Overview and History of R, Getting Help, Data Types, Subsetting, VectorizedOperations, Reading and Writing Data.
Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards, Scoping Rules, Debugging Tools, Simulation, R Profiler.

TEXT BOOKS:

1. William N. Venables and David M. Smith, An Introduction to R. 2nd Edition. Network Theory Limited.2009
2. Norman Matloff, The Art of R Programming - A Tour of Statistical Software Design, No Starch Press.2011

BCS-SEC2.4 PERL/ CGI

Installation of Perl, Variables in Perl, Comments in Perl: Single Line, Multi Line;

Loops in Perl: for Loop, for-each Loop, while Loop, do-while Loop;

Conditional Statements: if-Else Statement, switch Statement;

Data Structures in Perl: Scalar, Array, Associative Array or Hash, Array functions; Hash in Perl; Functions in Perl; Blocks in Perl; Access Modifiers in PERL; Referencing & Dereferencing in Perl; Special Variables in PERL;

File Handling; Exception and error handling in PERL; Including files and/or modules in a PERL program; PERL & HTML; Function Prototyping; Oops in Perl; Exporting functions in Perl; Pattern Matching / Regular expression in Perl;

Database handling; Multithreading; Socket Programming: use IO::Socket::INET;

TEXT BOOKS:

1. CGI Programming with Perl, 2nd EditionCreating Dynamic Web Pages, Gunther Birznieks, Scott Guelich, ShishirGundavaram, O'Reilly Media.
2. IvanBayross, "Web Technologies Part-II" BPB Publications

FIFTH SEMESTER

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-501	Web Technology	4	-	4	10	20	30	70	100	4/2

BCS-501 WEB TECHNOLOGY

Unit-I: Introduction

Introduction to the Internet, Introduction to HTML Terminology, **Designing a Webpage:** Design Considerations and Planning, Basic Tags and Document Structure, HTML Tags, Head Tags, Title Tags, Body Tags, Metadata, Saving an HTML Page

Unit II: Page Formatting

Adding a New Paragraph, Adding a Line Break, Inserting Blank Space, Preformatted Text, Changing a Page's Background Color, Div Element. **Text Items and Objects:** Headings, Comments, Block Quotes, Horizontal Lines. Special Characters. **Creating Lists:** Numbered (Ordered) Lists, Bulleted (Unordered) Lists, Nested Lists, Definition Lists.

Unit III: Links

What are Links?, Text Links, Image Links, Opening a Page in a New Window or Tab, Setting all Links on a Page to Open in a New Window or Tab, Linking to an Area on the Same Page (Bookmarks), Linking to an E-mail Address, Linking to Other Types of Files. **Images:** Introduction to Images for Webpages, Adding Images to Webpages, Resizing an Image, Alternative (ALT) Text, Image Labels.

UNIT IV: Tables& Forms

Inserting a Table, Table Borders, Table Headers, Col and row span, **IFrames:** What is an Iframe?, Inserting Iframes, Setting Height and Width, Using an Iframe for a link target. **Forms:** About Forms, Text Boxes, Text Areas, Check Boxes, Menu Lists, Radio Buttons, The Submit Button, The Reset Button, Changing the Tab Order, Sending to E-mail, event handling

UNIT V:Video and Audio

About Video and Audio Files, Linking to Video and Audio Files, Adding Video, Adding Audio, Using YouTube to Display Video.

UNIT VI: Cascading Style Sheets

CSS Introduction , CSS Syntax, Creating an External CSS, Linking to a CSS, Adding Comments and Notes to a CSS, Creating an Internal Style Sheet, ID and Class, Inline Styling. **Working With Text in CSS:** Emphasizing Text (Bold and Italic), Decoration, Indentation, Transformation, Text Alignment, Fonts, Font Sizes, Letter Spacing, Text Color, Margins, Padding, Borders, Styling Links, Number and Bullet Styles, Sizing Elements, Text Wrapping, Shadowing.

UNIT VII: Creating Backgrounds in CSS:

Colors, Images, Fixed Images. **Images in CSS:** Opacity, Floating Images, Image Galleries, Image Sprites. **Box Model in CSS:** What is a box model?, Margin, Padding, Border, Outline. **Adding a Navigation Bar in CSS:** Vertical Navigation Bar, Horizontal Navigation Bar – Inline, Horizontal Navigation Bar – Floating. **CSS Tables:** Borders, Collapsed Borders, Table Width and Cell Height, Table Color, Table Text Element, Table Padding.

Book References:

1. HTML & CSS: The Complete Reference, Fifth Edition, Thomas A. Powell.
2. Burdman, "Collaborative Web Development", Addison Wesley
3. Sharma & Sharma, "Developing E-Commerce Sites" Addison Wesley
4. IvanBayross, "Web Technologies Part-I" BPB Publications

S.No	Course No.	Subject	Evaluation – Scheme								Theory/ Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BCS-502	.NET Programming	4	-	2	10	20	30	70	100	4/2

BCS-502 .NET PROGRAMMING

UNIT 1

Introduction to .NET Framework- .NET framework, MSIL, CLR, CLS, CTS, Just in time (JIT) Compiler,Base class library, Namespaces, Assemblies, DLL Hell -Problem ,Garbage Collection.

UNIT 2

C# Object oriented programming- OOPs, Classes and objects, loops, Array, Encapsulation, Inheritance, Polymorphism, Interface ,Constructor and Destructors, Method Overloading ,Method overriding, Operator Overloading, Modifiers, Indexers , Collections Namespaces, Delegates, Exception Handling.

UNIT 3

Microsoft .NET IDE- Creating a Project and solution, Building project, Debugging project, Solution Explorer,Toolbox,Server Explorer, Property Window, Windows Forms and Controls in details-The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls .

UNIT 4

ADO.Net, C# windows forms for data control: Grid, Datasource and databinding controls, Connected and disconnected scenarios, Dataset, connections, Adapters, commands, datareaders.

UNIT 5

ASP.net-Introduction to ASP.NET, Architecture ,Working with Web and HTML Controls, Web forms ,Using Rich Server Controls, Overview of ASP.NET Validation Controls, Data base connectivity using ASP.net.

TEXT BOOKS:

1. A Guide to the Project Management Body of Knowledge (PMBOK), Project Management Institute, PA.
2. Addison Wesley –C# Developers Guide to ASP.Net
3. Wiley," Beginning Visual C# 2008",Wrox

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
3.	BCS-DSE1	DSE1	4	-	-	10	20	30	70	100	4

DSE1.1 THEORY OF COMPUTATION

UNIT 1

Introduction of Finite Automata- Alphabets, Strings, Languages, Finite Automata (FA), acceptance of strings and languages, Deterministic Finite Automata (DFA) and Non Deterministic Finite Automata (NFA), transition diagrams and Language recognizers. Conversions and Equivalence: Equivalence between NFA with and without ε-transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output-Moore and Mealy machines.

UNIT 2

Regular Expressions & Languages- FA and Regular Expressions, Conversion from RE to FA and FA to RE, Pumping lemma for regular languages, Closure properties of regular languages, Equivalence and minimization of Automata.

UNIT 3

Context Free Grammars and Languages-CFG, Leftmost, Rightmost derivations ,Ambiguity in grammars and languages. Simplification of Context Free Grammars, Chomsky normal form (CNF), Greibach normal form (GNF), Pumping Lemma for Context Free Languages.

UNIT 4

Push Down Automata-Definition and languages of PDA, Equivalence &conversion of CFG's and PDA's, Deterministic PDA.

UNIT 5

Turing Theory-Turing Machines, definition, model, design of TM, Variations of TM-Multitape TMs, Non Deterministic TM, Universal TM ,The Church-Turing thesis Recursively enumerable languages, Context - Sensitive Languages and the Chomsky Hierarchy. Unsolvable Problems-Halting Problem, Post's Correspondence Problem (PCP).

TEXT BOOKS:

1. Hopcroft JE. and Ullman JD., "Introduction to Automata Theory, Languages & Computation", Narosa.
2. K.L.P Mishra & N. Chandrasekharan – "Theory of Computer Science", PHI
3. Ash & Ash – "Discrete Mathematics",TMH
4. Martin—Introduction

BCS-DSE1.2 MICROPROCESSORS

UNIT 1

Introduction to Microprocessor, History of Microprocessors, Micro-Computers and Micro-Controllers, Microprocessor architecture and its operations, Memory, Input & output devices, Logic devices for interfacing, The 8085 MPU, Example of an 8085 based computer, Memory interfacing & Address Decoding.

UNIT 2

Basic interfacing concepts, Interfacing output displays, Interfacing input devices, Memory mapped I/O, Peripheral Mapped I/O, Flow chart symbols, Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation, Writing assembly language programs, Programming techniques: looping, counting.

UNIT 3

Additional data transfer and 16 bit arithmetic instruction, Arithmetic operations related to memory, Logic operation: rotate, compare, Stack, Subroutine, Restart, Conditional call and return instructions, 8085 Interrupts, 8085 vector interrupts, RIM & SIM Instruction.

UNIT 4

Program: Addition, subtraction, multiplication & division of 8-bit numbers, finding largest & smallest numbers in an array, sorting of array, BCD-to-Binary conversion, Binary-to-BCD conversion.

UNIT 5

8255 Programmable peripheral interface, interfacing keyboard and seven segment display, Direct Memory Access and 8237 DMA controller.

TEXT BOOKS:

1. Ramesh Gaonkar, “Microprocessor Architecture, Programming, and Applications with the 8085”, 5th Edition, Penram International Publication (India) Pvt. Ltd.
2. Douglas V. Hall, “Microprocessors and Interfacing”, Tata McGraw Hill.

BCS-DSE1.3 ANALYSIS AND DESIGN OF ALGORITHMS

UNIT 1

Introduction:Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences.Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort Medians and order statistics.

UNIT 2

Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B Trees, Binomial Heaps, Fibonacci Heaps, Data Stricture for Disjoint Sets.

UNIT 3

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis.

UNIT 4

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem.

UNIT 5
Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms.

TEXT BOOKS:

1. Coreman, Rivest, Lisserson, : "Algorithm", PHI.
3. A V Ahoetal, "The Design and analysis of Algorithms", Pearson Education

BCS-DSE1.4 GRAPH THEORY

Unit-1

Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs, paths and circuits

Unit-II

Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph, travelling salesman's problem,

Unit-III

Shortest path Algorithms: Dijkstra's , Floyd-Warshall algorithm.

Unit-IV

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees- prims, Kruskal, fundamental circuits.

Unit V

Coloring and covering partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Matching, covering, Four color problem.

TEXT BOOKS:

1. Joshi K. D., "Fundamental of discrete mathematics", New Age International
2. John Truss, "Discrete mathematics for computer scientist"
3. C. L. Liu, "Discrete mathematics
4. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 2nd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint 2003.

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
4.	BCS-DSE2	DSE2	4	1	-	10	20	30	70	100	4

BCS-DSE2.1 CRYPTOGRAPHY AND NETWORK SECURITY

UNIT 1

Introduction To security: Attacks, Services & Mechanisms, Security, Attacks, Security Services, Conventional Encryption: Classical Techniques, Conventional Encryption Model, and steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operations.

UNIT 2

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RC5, Placement & Encryption Function, Key Distribution, Random Number Generation, Placement of Encryption Function.

UNIT 3

Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Function Birthday Attacks, Security of Hash Function, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signature, Authentication Protocol, Digital Signature Standard (DDS)

UNIT 4

Network & System Security: Authentication Applications: Kerberos X-509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP)/Mime
Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management.

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security: Principles and Practice"' Prentice hall, New Jersey
2. Johannes A. Buchmann, "Introduction to Cryptography" Springer-Verlag
3. AtulKahate, "Cryptography and Network Security" TMH

BCS-DSE2.2 CLOUD COMPUTING

UNIT 1

CLOUD COMPUTING FUNDAMENTALS: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

UNIT 2

CLOUD APPLICATIONS: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages.

UNIT 3

MANAGEMENT OF CLOUD SERVICES: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics : Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat)

UNIT 4

APPLICATION DEVELOPMENT: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

TEXT BOOKS:

1. GautamShroff, “Enterprise Cloud Computing Technology Architecture Applications”, Cambridge University Press; 1 edition.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach” McGraw-Hill Osborne Media; 1 edition
3. Dimitris N. Chorafas, “Cloud Computing Strategies” CRC Press; 1 edition

BCS-DSE2.3 MOBILE COMPUTING

UNIT 1

Introduction to Mobile Computing, Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, cellular system architecture, Multiple Access Protocols : TDMA, FDMA and CDMA, GSM, GPRS, handoffs, Near-far problem, channel allocation in cellular systems.

UNIT 2

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, TCP over wireless- Indirect TCP, Snoop Protocol, Fast retransmit and Mobile TCP, Mobile IP, WAP: Architecture, applications.

UNIT 3

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system (CODA), Disconnected operations.

UNIT 4

Mobile Agents computing, transaction processing in mobile computing environment, location management- static and dynamic, Ping pong effect, location based services.

UNIT 5

What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Dynamic State Routing (DSR), Route Maintenance and Routing error, Fisheye Routing (FSR), Ad-hoc on Demand Distance Vector (AODV)

TEXT BOOKS:

1. ShambhuUpadhyaya, AbhijeetChaudhary, Kevin Kwiat, Mark Weises, “Mobile Computing”, Kluwer Academic Publishers
2. UWE Hansmann, LotharMerk, Martin-S-Nickious, Thomas Stohe, “Principles of Mobile Computing”, Springer International Edition

BCS-DSE2.4 DATAWAREHOUSING AND DATAMINING

UNIT 1

DSS - Uses, definition, Operational Database, Introduction to DATA Warehousing. Data-Mart, Concept of Data-Warehousing, Multi-Dimensional Database Structures, Client/Server Computing Model & Data Warehousing, Parallel Processors & Cluster Systems, Distributed DBMS implementations.

UNIT 2

DATA Warehousing, Data Warehousing Components, Building a Data Warehouse, Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture, DBMS Schemas for Decision Support. Data Extraction, Cleanup & Transformation Tools, Metadata.

UNIT 3

Business Analysis, Reporting& Query Tools & Applications. On line Analytical Processing (OLAP), Patterns &Models. Statistics. Artificial Intelligenc**e.**

UNIT 4

Knowledge Discovery, Data Mining. Introduction to Data-Mining, Techniques of Data-Mining, Decision Trees. Neural Networks, Nearest Neighbor &Clustering, Genetic Algorithms. Rule Introduction. Selecting &Using the Right Technique.

TEXT BOOKS:

1. Margaret H. Dunham, “Data-Mining. Introductory & Advanced Topics”, Pearson Education
2. Pieter Adriaans, DolfZantinge, “Data-Mining”, Pearson Education

SIXTH SEMESTER

S.No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
1.	BCS-601	Computer Graphics	4	-	3	10	20	30	70	100	4

BCS-601COMPUTER GRAPHICS

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display Plotters, Printers. Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Input Techniques: Positioning techniques, Potentiometers, Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points defining a boundary rectangle, multiple selections, Menu selection.

Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

Line Drawing Algorithms: DDA Algorithms, Bresenham's Line algorithm.
Segment & Display files: Segments, Functions for segmenting the display file, Posting and posting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file structure.

Graphics Operations: Clipping, Point Clipping, Line Clipping, Polygon Clipping. Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.
Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, superellipsoid, Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems. 3D Graphics: 3D Display Methods, 3D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal.

Animation: Introduction to Animation to Animation, Principles of Animation, Types of Animation, Types of Animation Systems: Scripting, Procedural, Representational, Stochastic, etc. Animation Tools: Hardware-SGI, PC's Amiga etc.

TEXT BOOKS**:**

1. Donald Hearn and M Pauline Baker, "Computer Graphics" PHI
2. Steven Harrington, "Computer Graphics: A Programming Approach" TMH
3. Prajapati A.K. "Computer Graphics" PPM Ed2

S.No	Course No.	Subject	Evaluation – Scheme								Theory/Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BS-DSE3	DSE3	4	-	4	10	20	30	70	100	4/2

BCS-DSE3.1 ADVANCED JAVA

UNIT 1

Core Java: Introduction Operator, Data Types, Variable, Arrays, Control statements, Methods & classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling,

UNIT 2

Introduction to AWT, AWT controls, Layout manager, Menus, Images, Graphics, Java Swing: Creating a swing applet and application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner Frame.

UNIT 3

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database. Swings, Java Beans: Application Builder tools, the bean developer kit (BDK). JAR files, Introspection, Developing a simple bean, using Bound properties. The Java Beans API, Session Beans, Entry Beans, Introduction to Enterprise Java beans (EJB).

UNIT 4

Introduction to RMI (Remote Method Invocation): A simple client server application using RMI, Java Servlets: Servlet API basic, Life cycle of a servlet, Running Servlet, Debugging Servlets. Thread-safe servlets HTTP Redirects, Cookies, Introduction to Java Server ages (JSP).

TEXT BOOKS:

1. MargarelLevingYoung."The complete Reference Internet" TMH
2. Naughton, Schidt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA, TMH

BCS-DSE3.2 ASP.NET

Introduction to .NET framework : Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation - Automatic Memory Management.

Language Concepts and the CLR: Visual Studio .NET - Using the .NET Framework.

The Framework Class Library: NET objects - ASP .NET - .NET web services – Windows Forms

ASP.NET Features: Change the Home Directory in IIS - Add a Virtual Directory in IIS- Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site.

Creating Web Controls: Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page.

Creating Web Forms: Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

TEXT BOOKS

1. Addison Wesley –C# Developers Guide to ASP.Net

BCS-DSE3.3 ANDROID PROGRAMMING

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.

UNIT4

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.
User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes),Images, Menu, Dialog.

TEXT BOOKS:

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

S.No	Course No.	Subject	Evaluation – Scheme								Theory/Practical Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
2.	BCS-DSE4	DSE4	4	1	-	10	20	30	70	100	5

BCS-DSE4.1 DESIGN OF COMPILERS

UNIT 1

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler.
Programming Language: High level languages, lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission. Lexical Analysis: The role of Lexical Analyzer, A Simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer.

UNIT 2

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive descent Parsers, Predictive Parser, Bottom-up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC

UNIT 3

Intermediate Code Generation: Different Intermediate forms: Three address code, Quadruples & Triples, Syntax Directed Translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation. Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management.
Error Detection and Recovery: Lexical phase errors. Syntactic phase errors, semantic errors.

UNIT 4

Code Optimization and Code Generation: Local optimization, Peephole optimization, Basic blocks and flow Graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

TEXT BOOKS:

1. Alfred V Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa
2. A.V. Aho, R. Sethi and J.D.Ullman, "Compiler Principle, Tech & tools" AW
3. H.C. Holub "Compiler Design in C", Printice Hall Inc.
4. Apple, "Modern Computer Implementation in C: Basic Design" Cambridge Press

BCS-DSE4.2 ADVANCED DBMS

UNIT 1

Transaction Processing Concepts: Transaction system, testing of serializability, Serializability of Schedules Conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, Checkpoints, deadlock handling

UNIT 2

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version Schemes, Recovery with concurrent transaction.

UNIT 3

Distributed DBMS Concepts and design: Introduction, functions and architecture of a DDBMS, transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database, Introduction to OODBMS.

TEXT BOOKS:

1. Adv. DBMS by V.K. Jain, Cyber Tech Publication, 5A/13 Ansari Road, Daryagang, N.Delhi.-110002
2. Date C.J. "An Introduction to Database System". Addision Wesley
3. Korth, Silbertz, Sudarshan, "Database Concepts" McGraw Hill
4. Elmasri, Navathe, "Fundamentals of Database Systems" Addision Wesley

BCS-DSE4.3 ADVANCED COMPUTER NETWORKS

UNIT 1

Introduction: Overview of computer network, seven-layer architecture, TCP/IP suite of protocol.

UNIT 2

Mac protocols for high-speed LANS, MANs & WIRELESS LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet etc.) Fast access technologies. (For example, ADSL, Cable Modem, etc.)

UNIT 3

IPv6: why IPv6, basic protocol, IPv6 main header extension headers, support for QoS, security, etc, ESP, Authentication header

UNIT4

Network security:. Symmetric and asymmetric cryptography, Secure-HTTP, SSL,, Key distribution protocols. Digital signatures, digital certificates.

TEXT BOOKS

1. W. R. Stevens, "TCP/IP illustrated, Volume 1: The protocols", Addison Wesley 1994.
2. G. R. Wright. "TCP/IP illustrated, Volume 2: The implementation", Addison Wesley 1995
3. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
4. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI
5. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education

BCS-DSE4.4 ARTIFICIAL INTELLIGENCE

UNIT 1

Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area problem 3OIving in games, natural language, automated reasoning, visual perception, heuristic algorithm versus solution guaranteed algorithms.

UNIT 2

Understanding Natural Languages. Parsing techniques, Context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammars, Shanks Conceptual Dependency, grammar free analyzers, sentence generation, and translation.

UNIT 3

Knowledge Representation, First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets, Partitioned Nets, Minskey frames, Case Grammar Theory, Production Rules Knowledge Base, the Interface System, Forward & Backward Deduction.

UNIT 4

Expert System Existing Systems (DENDRAL, MYCIN), Inference Engine, domain exploration Meta Knowledge, Expertise Transfer, Self Explaining System.

UNIT 5

Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception Semantic & Model, Object Identification, Speech Recognition.
Programming Language; Introduction to programming Language, LISP, PROLOG.

TEXT BOOKS:

1. Winston, “LISP”, Addision Wesley.
2. Marcellous, “Expert Sys tem Programming”, PHI.
3. Elamie, “Artificial Intelligence”, Academic Press.

	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
	Generic Electives	Statistics	4	1	-	10	20	30	70	100	5

BCS- GE1 STATISTICS

UNIT I: DATA & ITS DIAGRAMMATIC REPRESENTATION
Definition of Statistics, Data ,Primary data & secondary data, classification of data, tabulation of data ,individual series, Discrete frequency Distribution ,continuous frequency distribution, Exclusive and inclusive continuous series, Diagrammatic representation of data ,Tabular form ,1D(All Bar Diagrams),2D,3D diagrams ,pictogram, cartogram, graphical form, Histogram, Frequency polygon, frequency curve, Ogive.

UNIT II: MEASURE OF CENTRAL TENDANCY & DISPERSION
Mean (Arithmetic Mean, Weighted Mean, Harmonic Mean, Geometric Mean), Median, Mode, Histogram & Mode, Relationship between mean, median, mode. Definition of dispersion, Range, Quartile deviation & its coefficient, Inter Quartile deviation, Mean deviation & its coefficient, Standard deviation.

UNIT III: **CORRELATION & REGRESSION ANALYSIS**
Correlation definition, types of correlation, Karl Pearson coefficient of correlation, Spearman coefficient of correlation, repeated rank. Regression, regression lines, Regression line of Yon X & X on Y, Regression coefficient, Relationship between correlation & regression coefficient.

UNIT IV: PROBABILITY & PROBABILITY DISTRIBUTIONS probability & probability distribution: probability, Sample space & events ,types of event, conditional probability, Bayes theorem, Mathematical expectation, Probability distribution: random variables, binomial distribution, Poisson Distribution, Normal distribution.

UNIT V: SAMPLING, HYPOTHESIS TESTING & STATISTICAL TEST

Sampling & its type, Probability & Non probability sampling, Hypothesis, Null hypothesis, Alternative hypothesis, Type I & Type II Errors Statistical Test, Parametric test & Non parametric test, F test ,T test, ANOVA -1 ,ANOVA 2, Chi square test as a goodness of fit, Chi square test as test of independence.

TEXT BOOKS:

1. Gerald Keller : Managerial Statistics 9th Edition.
2. Richard Levin & David Rubin : Statistics for management, Prentice Hall.
3. Anderson, Sweeny & Williams: Statistics for Business and Economics, South W

	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
	Generic Electives	Operations Research	4	-	-	10	20	30	70	100	4

BCS-GE2 OPERATIONS RESEARCH

UNIT 1

Linear programming: Mathematical formulations of LP Models graphical and simplex method of solving LP problems; sensitivity analysis; duality.

UNIT 2

Transportation problem: Various methods of finding Initial basic feasible solution and optimal solution –North West Corner Rule, Least Cost Method, Vogel's Approximation Method**.**

UNIT 3

Assignment model: Hungarian Method**.**
Game Theory: Concept of game; Two-person zero-sum game; Pure and Mixed Strategy Games; Saddle Point;

UNIT 4

Sequencing Problem: Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, Two jobs and m - Machines Problems.

UNIT 5

Project Management: Rules for drawing the network diagram, Applications of CPM and PERT techniques in Project planning and control

TEXT BOOKS:

1.Apte-Operation Research and Quantitative Techniques (Excel Books)
2. S Kalawathy-Operation Research (Vikas IVth Edition)
3. Natarajan- Operation Research(Pearson)
4. Singh & Kumar—Operation Research(UDH Publisher edition 2013)

	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
	Generic Electives	Economics	4	-	-	10	20	30	70	100	4

BCS-GE3 ECONOMICS

UNIT 1

Introduction to Economics; Nature and Scope of Management Economics, Significance in decision-making and fundamental concepts, Objectives of a firm, Gap between theory and practice and role of managerial economist**.**

UNIT 2

Demand Analysis; Law of Demand, Exceptions to the law of Demand, Determinants of Demand. Elasticity of Demand- Price, Income, Cross and Advertising Elasticity; Uses of Elasticity of Demand for managerial decision making, measurement of Elasticity of Demand. Demand forecasting meaning, significance and methods.

UNIT 3

Supply Analysis; Law of Supply, Supply Elasticity; Analysis and its uses for managerial decision making.
Production concepts & analysis; Production function, single variable-law of variable proportion, two variable- Law of returns to scale. Cost concept and analysis, short-run and long-run cost curves and its managerial use.

UNIT 4

Market Equilibrium and Average Revenue Concept. Market Structure: Perfect Competition, features, determination of price under perfect competition. Monopoly: Feature, pricing under monopoly, Price Discrimination. Monopolistic: Features, pricing under monopolistic competition, product differentiation. Oligopoly: Features, kinked demand curve, cartels, price leadership. Pricing Strategies; Price determination, full cost pricing, product line pricing, price skimming, penetration pricing**.**

UNIT 5

National Income; Concepts and various methods of its measurement, Inflation, types and causes, Business Cycle, Profit concept and major theories of profits; Dynamic Surplus theory, Risk & Uncertainty bearing theory and Innovation theory.

TEXT BOOKS:

1. Dwivedi D.N. - Managerial Economics (Vikas Publication, 7th Edition)
2. Petersen/jain Managerial economics-4e (Prentice hall)
3. Raj Kumar-Managerial Economics(UDH PUBLISHERS, 2013 edition)
4. Damodaran Suma – Managerial Economics (Oxford 2006)

	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
	Generic Electives	Organisational Behaviour	4	-	-	10	20	30	70	100	4

BCS-GE4 ORGANISATIONAL BEHAVIOUR

UNIT 1

Basic forms of Business Ownership, Special forms of ownership: Franchising, Licensing, Leasing; Choosing a form of Business ownership; Corporate Expansion: mergers and acquisitions, diversification, forward and backward integration, joint ventures, Strategic alliance Evolution of Management Theory. Managerial functions and Roles, Insights from Indian practices and ethos.

UNIT 2

Overview of Planning: Types of Plans& The planning process; Decision making: Process, Types and Techniques. Control: Function, Process and types of Control; Principles of organizing: Common organizational structures, Delegation & Decentralization: Factors affecting the extent of decentralization, Process and Principles of delegation.

UNIT 3

Importance of organizational Behavior, Perception and Attribution: Concept, Nature, Process, Personality: Personality: Learning: Concept and Theories of Learning, reinforcement, Motivation: Concepts and their application, Need, Content & Process theories, Contemporary Leadership issues: Charismatic, Transformational Leadership. Emotional Intelligence

UNIT 4

Groups and Teams: Definition, Difference between Groups and teams; Stages of Group Development, Group Cohesiveness, Types of teams. Analysis of Interpersonal Relationship: Transactional Analysis, Johari Window Organizational Power and Politics: Nature of organizational politics. Conflict: Concept, Sources, Types, Stages of conflict, Management of conflict, Organizational Change: Concept, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change. Managing Stress: Insights from Indian ethos

TEXT BOOKS:

1. Gilbert: Principles of Management, McGraw Hill.
2. Greenberg Jerald and Baron Robert A.: Behaviour in Organisations:
3. Understanding and Managing the Human Side of Work, Prentice Hall of India.

	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	TOT	ESE	Sub. Total	
Theory											
	Generic Electives	Consumer Affair	4	-	-	10	20	30	70	100	4

BCS-GE5: Consumer Affair

Objective: This paper seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit 1: Conceptual Framework
Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology.
Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

Unit 2: The Consumer Protection Law in India
Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.
Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

Unit 3: Grievance Redressal Mechanism under the Indian Consumer Protection Law
Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.
Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

Unit 4: Role of Industry Regulators in Consumer Protection
i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance Ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI
v. Electricity Supply: Electricity Regulatory Commission
vi. Real Estate Regulatory Authority

Unit 5: Contemporary Issues in Consumer Affairs

Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview

Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) *Consumer Affairs*, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). *Consumer Protection Law Provisions and Procedure*, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). *Globalisation and Consumerism: Issues and Challenges*, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), *Consumer is King*, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). *Consumer Right for Everyone* Penguin Books.
7. E-books :- www.consumereducation.in
8. Empowering Consumers e-book,
9. ebook, www.consumeraffairs.nic.in
10. *The Consumer Protection Act, 1986 and its later versions.*