

Curriculum and Credit Framework for Undergraduate Programme (Single Major) as per NEP-2020

B.Sc Data Science (Four Year Degree Programme)

1st & 2nd Semester

For Batch w.e.f. Session: 2023-24



Department of Computer Science & Engineering

Faculty of Engineering & Technology

Chaudhary Devi Lal University

Sirsa-125055, Haryana

2023

Exit options and Credit requirements

SINGLE-MAJOR

Exit with	Credit requirement
Certificate in Data Science: After successful completion of First year (Two semesters) of the Four-Year Undergraduate Degree Programme.	48 (Including Internship of 4 Credits)
Diploma in Data Science: After successful completion of Two years (Four semesters) of the Four-Year Undergraduate Degree Programme.	94 (Including Internship of 4 Credits)
Bachelor of Data Science: After successful completion of Three years (Six semesters) of the Four-Year Undergraduate Degree Programme.	136
Bachelor of Data Science (Honours/Honours with Research) After successful completion of Four Years (Eight semesters) of the Undergraduate Degree Programme.	184

Course Category	Course Code	Course Title	Level	Credits			Marks		
				L	P	Total	Int	Ext	Total
Semester-1									
1. DSC	B.Sc/DS/SM/DSC/1/101	Programming with C	100	2	-	2	15	35	50
	B.Sc/DS/SM/1/DSC/1/102	Programming with C (Lab-Work)	100	-	2	2	-	50	50
	B.Sc/DS/SM/1/DSC/1/1	DBMS	100	2	-	2	15	35	50

	03									
	B.Sc/DS/SM/1/DSC/1/104	DBMS (Lab-Work)	100	-	2	2	-	50	50	
2. MIC	B.Sc/DS/SM/1/MIC/1/101	Office Automation	100	2		2	15	35	50	
	B.Sc/DS/SM/1/MIC/1/102	Office Automation (Lab-Work)	100	-	2	2	-	50	50	
3. MDC	B.Sc/DS/SM/MDC/1/101	E-Commerce	100	3	-	3	25	50	75	
4. AEC	Hin/AEC/101	Hindi-I	100	2	-	2	15	35	50	
5. SEC	B.Sc/DS/SM/SEC/1/101	Digital Fluency	100	3	-	3	25	50	75	
6. VAC	EVS/VAC/101	EVS-I	100	2	-	2	15	35	50	
Total						22			550	
Semester-II										
1.DSC	B.Sc/DS/SM/DSC/2/105	Object Oriented Programming With C++	100	2	-	2	15	35	50	
	B.Sc/DS/SM/DSC/2/106	Object Oriented Programming With C++ (Lab-Work)	100	-	2	2	-	50	50	
	B.Sc/DS/SM/DSC/2/107	Data Structure With C	100	2	-	2	15	35	50	
	B.Sc/DS/SM/DSC/2/108	Data Structure With C (Lab-Work)	100	-	2	2	-	50	50	
2. MIC	B.Sc/DS/SM/MIC/2/103	Information Technology	100	2		2	15	35	50	
	B.Sc/DS/SM/MIC/2/104	Information Technology (Lab-Work)	100	-	2	2	-	50	50	
3. MDC	B.Sc/DS/SM/2/MDC/102	Cyber Space	100	3	-	3	25	50	75	
4. AEC	ENG/AEC/101	English-I	100	3	-	3	15	35	50	
5. SEC	B.Sc/DS/SM/2/SEC/102	Cyber Law & Computing Ethics	100	3	-	3	25	50	75	
6.VAC	CDLU/VAC/101	Communication Skills	100	2	-	2	15	35	50	
Total						23			550	

SEMESTER-1

B.Sc/DS/SM/DSC/1/101 Programming with C							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	02	Lecture	35	15	2Hours	TEE/MTE/ Assignment/ Attendance
<p>Note for the Paper Setter: The question paper will consist of <i>five</i> questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.</p>							
<p>Course Objectives: The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C.</p>							

Unit 1

Programming fundamentals: Problem definition, algorithms, flow charts and their symbols, introduction to compiler, interpreter, debuggers, assembler, linker and loader and their inter relationship, Machine-, Assembly-, High Level- Language.

Elements of C: Character set, identifier and keywords, data type, declaration and definition, formatted input/ output, expressions.

Operators: Arithmetic, relation, logical, bit wise, unary, assignment and conditional operators their hierarchy and associatively.

Unit 2

Control Statements: Selection, sequencing, if and switch statement, Repetition for, while loops, do-while loop, break, continue, go to.

Arrays, functions.

Strings: Strings literals, string variables, I/O of strings, arrays of strings; applications.

Text Books:

1. Dennis M Ritchie, Brian W. Kernighan, The C Programming Language, 2nd edition, 2012, PHI.
2. K.N. King, C Programming – A modern approach, 2nd edition, 2008, WW Norton & Co.
3. Yashwant Kanetkar, Let Us C: Authentic guide to c programming language, 19th edition, 2022, BPB Publications.

B.Sc/DS/SM/DSC/1/102 Programming with C (Lab-Work)							
Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	04	Practical	50	-	3 Hours	Practical/ Viva-voce

Instructions to paper setter for Term-End Examination: The Term-End examination shall be conducted by a panel of one external and one internal examiner. The question paper for practical examination shall be set on the spot.

B.Sc/DS/SM/DSC/1/103 DBMS							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	02	Lecture	35	15	2 Hours	TEE/MTE/ Assignment/ Attendance

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

Unit 1

Basic concepts: Ahistorical perspective, file system vs. DBMS, characteristics of the database approach, abstraction and data integration, database users, advantages and disadvantages of DBMS, implication of database approach.

Database system concepts and architecture: Data models, schemas and instances, DBMS architecture and data independence database languages & interfaces, DBMS functions and component modules.

Entity-relationship model: Entity types, entity sets, attributes & keys, relationships, relationship types, E-R diagrams, design of an E-R database schema.

Conventional data models: An overview of network and hierarchical data models.

Unit 2

Relational data model: Relational model concepts, integrity constraints over relations, relational algebra – basic operations.

Relational database design: Functional dependencies, decomposition, desirable properties of decomposition, Normalization, normal forms based on primary keys (1 NF, 2 NF, 3 NF and BCNF).

Text Books

1. Elmasri & Navathe, Fundamentals of Database System, 3e, Addison Wesley, New Delhi.
2. Korth & Silberschatz, Database System Concept, 4e, McGraw Hill International Edition.

Reference Books

1. C.J. Date, An Introduction to Database System 7e, Addison Western, New Delhi.
2. Abbey Abramson & Cory, ORACLE SI-A Beginner's Guide, Tata McGraw Hill.

B.Sc/DS/SM/DSC/1/104 DBMS(LAB- WORK)							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	04	Practical	50	-	3 Hours	Practical/ Viva-voce

Instructions to paper setter for Term-End Examination: The Term-End examination shall be conducted by a panel of one external and one internal examiner. The question paper for practical examination shall be set on the spot.

B.Sc/DS/SM/MIC/1/101 Office Automation							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
MIC	02	02	Lecture	35	15	2 Hours	TEE/MTE/ Assignment/ Attendance

Note for the Paper Setter: The question paper will consist of *five* questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

Unit 1

Windows: Installation of Windows, Windows Desktop, My computer, My documents, Network neighbourhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar - System Tray - Quick launch tool bar - Start button - Parts of Windows, Working with Notepad & WordPad, Creating & Editing Images with Microsoft paint, using the Calculator.

MS-Word: Working with Documents, Formatting page & setting Margins, Importing & Exporting documents, Formatting Documents, Header & footer, Setting Footnotes & end notes, page break, Setting Document styles, Table of Contents, Index, Page Numbering, Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Drawing - Inserting Clip Arts, Pictures/Files.

Unit 2

MS-Excel: Spread Sheet & its Applications, Opening Spreadsheet, opening, Saving files, setting Margins, Spread sheet addressing - Rows, Columns & Cells, Referring Cells, Entering & Deleting Data, Inserting Data, Insert Cells, Column, rows & sheets, Functions, Formula, Formatting Spreadsheets, Working with sheets – Sorting, Filtering, Creating Charts.

MS-Power-Point: Introduction to presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts. Creating a presentation-Setting Presentation style, Adding text to the Presentation. Formatting a Presentation-Adding style, Colour, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, tables into presentation, Setting Animation & transition effect.

Reference Books:

1. V. Rajaraman, N. Adabala, Fundamentals of computers, 6th edition, 2014, Prentice Hall of India.
2. Satish Jain, M. Geeta, Kratika, Office 2010 Training Guide, 2010, BPB publications.
3. Wallace Wang, Microsoft Office 2019 for Dummies, 1st edition, 2018, Willey, India.
4. Tyler, Denise, Windows XP Home And Professional Editions, BPB Publications.

B.Sc/DS/SM/MIC/1/102 Office Automation(Lab-Work)							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
MIC	02	04	Practical	50	-	3 Hours	Practical/ Viva-voce
Instructions to paper setter for Term-End Examination: The Term-End examination shall be conducted by a panel of one external and one internal examiner. The question paper for practical examination shall be set on the spot.							

B.Sc/DS/SM/1/MDC/101: E-Commerce							
Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
MDC	03	03	Lecture	50	25	3 Hours	TEE/MTE/Assignment/Attendance
<p>Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will be set unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.</p>							
Course Objectives		The objective of this course is to understand concepts of e-commerce, model, framework, EDI and also know various issues of e-commerce.					
Course Outcomes		On completion of this course, the students will be able to:					

Unit I

E-commerce and its Technological Aspects: Overview of developments in Information Technology and defining E-Commerce, scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce, produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E- Commerce Architecture.

Unit II

Consumer Oriented E Commerce E-Retailing: Traditional retailing and e retailing, Benefits of e- retailing, Key success factors, Models of e retailing, Features of e retailing. E services: Categories of e-services, Web-enabled services, match making services, Information-selling on the web, e- entertainment, Auctions and other specialized services. Business to Business Electronic Commerce

Unit III

Electronic Data Interchange: Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

Issues in E Commerce Understanding Ethical, Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analysing Ethical Dilemmas, Candidate Ethical principles Privacy and Information Rights: Information collected at E-Commerce Websites, The Concept of Privacy, Legal protections Intellectual Property Rights: Types of Intellectual Property protection, Governance.

Text Books:

1. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
2. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A ManagerialPerspective", Addison-Wesley.
4. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, "E-Marketing", 3RDEdition, Pearson Education.

Hindi -I
हिंदी भाषा: सामान्य परिचय
HINDI/AEC/101

Credit – 2

Duration: 2 Hours per week

परीक्षा समय: 2 घंटे

कुल अंक: 50

लिखित परीक्षा: 35 अंक

आंतरिक मूल्यांकन: 15 अंक

Note for the Paper Setter: The question paper will consist of *five* questions in all. The first question will be compulsory and will consist of seven short questions of 1 marks each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

पाठ्यक्रम के उद्देश्य:

हिंदी भाषा की विकास-यात्रा से परिचय करवाना.

पाठ्यक्रम के अपेक्षित परिणाम

1. हिंदी भाषा के विकास व उसकी बोलियों का ज्ञान होगा
2. हिंदी भाषा के विविध रूप व प्रयोजनमूलकता से परिचित होंगे

खंड—एक

हिंदी भाषा: उद्भव एवं विकास

हिंदी की उपभाषाएं एवं बोलियों का वर्गीकरण

ब्रज, अवधि और खड़ी बोली का सामान्य परिचय एवं प्रवृत्तियाँ

खंड-दो

कंप्यूटर-परिभाषा, स्वरूप एवं महत्व

पारिभाषिक शब्दावली – बैंकिंग, वाणिज्य, मंत्रालय, उपक्रम, निगम, औद्योगिक क्षेत्र व मीडिया क्षेत्र

अनुवाद लेखन- अर्थ परिभाषा, स्वरूप, महत्व, प्रकिया प्रकार

टिप्पणी लेखन- अर्थ परिभाषा, नियम, लेखन विधि, उदाहरण

संदर्भ सूची:

1. हिंदी भाषा का उद्भव एवं विकास, उदयनारायण तिवारी
2. भाषा विज्ञान, डॉ. भोलानाथ तिवारी
3. हिंदी भाषा का इतिहास, लेखक धीरेन्द्र वर्मा
4. समसामयिक भाषा विज्ञान, लेखक वैष्णवा नारंग
5. हिंदी: उद्भव और विकास, हरदेव बाहरी, किताब महल, इलाहाबाद 1965

B.Sc/DS/SM/1/SEC/101: Digital Fluency							
Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		

SEC	03	03	Lecture	50	25	3 Hours	TEE/MTE/ Assignment/ Attendance
<p>Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will be set unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.</p>							
Course Content: Digital Fluency							
Unit I	Basic Computer Concepts and Operations: Basic Computer Concepts and Operations, Computers in Daily Activities, Computer Components, Basic File Handling Operations, Technology Trends in Education.						
	Internet Fundamentals and Applications: Using the Internet, Internet Applications, Google Advanced Search, Using Google forms, Internet Ethics and Security.						
Unit II	Virtual Learning Environments: Basics of Virtual Learning Environment, Virtual Learning Environment systems, Effective usage of Virtual Learning Environment, Investigate the Features of an LMS / VLE / CMS. Multimedia Fundamentals: Multimedia Elements, Multimedia Applications in Education, Multimedia Development Environments.						
Unit III	Digital Editing: Learning Objectives, Digital Editing Overview, Digital Content and Media, Digital editing tools, Editing Digital Text, Editing Digital Audio. Importance of the following: Effective Communication Skills, Creative Problem Solving & Critical Thinking, Collaboration and Teamwork Skills , Innovation & Design Thinking.						
Text/Reference Books							
Text Books	1. S P Sajjan, “Digital Fluency 2021”, Ekalavya e-Educate						
Reference Books	1. “Digital Fluency Book”, Cambridge Publishing Company Online. Delivered by Amazon						

Environmental Studies –I

EVS/VAC/101

Credits: 2
Duration of Examination: 2 hrs

Internal Assessment: 15
Semester End Examination: 35
Total Marks: 50

Objective: The objective of this paper is to create the awareness among the students towards Environmental concepts and issues for smooth life of species and human at earth.

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 marks each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

UNIT I

Introduction to Environment: The multidisciplinary nature of environmental studies: Definition, scope and importance, need for public awareness. Environmental Ethics: anthropocentric and eco-centric perspective.

Natural resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: use and over-exploitation, Deforestation, Timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, dams- conflicts over water and problems. Minerals resources: Use and exploitation, environmental effects of extracting and using minerals resources. Food resources: World food issues, changes caused by agriculture and overgrazing, effects of modern agriculture on agro ecosystem, agrochemical issues, water logging, salinity, Energy resources; Growing energy needs, renewable and non-renewable energy resources. Land resources: Land as resource: land degradation man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable life style. Sustainable development: concept, initiatives for sustainable development: regional, state and global, Sustainable Development Goals.

UNIT II

Ecosystem: Concept, Structure and Function. Producers, Consumers and Decomposers, Energy flow in the ecosystem, Concept and type of ecological succession, Food chains, food webs and Ecological pyramids, Introduction, types, characteristics features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, desert ecosystem, Aquatic ecosystem (Ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity and its conservation: Introduction-Definition: Genetic, species and Ecosystem diversity, Bio-geographical classification of India. Value of Biodiversity: consumptive use, productive use, social, ethical; aesthetic and optional. Biodiversity at local, National and Local levels. India as Mega-diverse a Nation. Hot spots of Biodiversity. Threats to biodiversity, Habitat loss, poaching of wildlife, man-wildlife conflicts. Endemic species, conservation of biodiversity: In situ and Ex-situ, conservation of biodiversity. Convention on biological diversity, Aichi targets.

Water pollution: Natural and anthropogenic sources of water pollution and their effects. Marine pollution, Thermal pollution, Eutrophication, Ground water pollution.

Air pollution: Sources, Classification and properties of air pollutants (Particulate matter, Inorganic gaseous pollutants, Organic gaseous pollutants), Smog, Acid rain, Ozone layer depletion, Green house effects, Global warming, Effects of air pollution on Human health

Soil pollution: Soil pollution from the use of agrochemicals (viz. Fertilizers and Pesticides), Heavy metals, Industrial effluents and Detrimental effects of soil pollutant, Remedial measures for soil pollution. Types and sources Solid waste, Electronic waste

Radioactive and Noise pollution: Definition Sources of radioactive pollution, Radioactivity, effects of radioactive pollution, Sound pressure level, Frequency, noise monitoring and sound level meter, Sources and effects of noise pollution, Effects of noise pollution on human health. Role of individual in prevention of pollution.

Suggested Readings:

1. Agarwal, K.C. 2001 *Environmental Biology*, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, *The Biodiversity of India*, Mapin Publishing Pvt. Ltd., Ahmedabad- 380013, India.
3. Clerk RS., *Marine Pollution*; Clarendon Press Oxford.
4. Down to Earth, Centre for Science and Environment.
5. Hawkins R.E., *Encyclopedia of Indian Natural History*, Bombay Natural History Society, Bombay.
6. Mhaskar A.K, *Matter Hazardous*, Techno-Science Publications.
7. Townsend C., Harper J, and Michael Begon, *Essentials ecology*, Blackwell Science.

SEMESTER-II

B.Sc/DS/SM/DSC/2/105 : Object Oriented Programming With C++							
Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	02	Lecture	35	15	2 Hours	TEE/MTE/ Assignment/ Attendance

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

Unit 1

Introduction to OOPs and C++ Element: Introduction to OOPs, Features & Advantages of OOPs, Elements of C++ (Tokens, Keywords, Identifiers, Variable, Constant, Operators, Expression, String).

Program Control Statements : Sequential Constructs, Decision Making Construct, Iteration / Loop Construct, Arrays, Functions (User defined Function, Inline Function, Function Overloading), User Defined Data Types (Structure, Union and Enumeration).

Unit2

Class, Object, Constructor & Destructor: Class, Modifiers (Private, Public & Protected), Data Member, Member Function, Static Data Member, Static Member Function, Friend Function, Object, Constructor (Default Constructor, Parameterized Constructor and Copy Constructor), Destructor.

Pointer, Polymorphism & Inheritance : Pointer (Pointer to Object, this Pointer, Pointer to Derive Class), Introduction to Polymorphism (Runtime Polymorphism, Compile time Polymorphism), Operator Overloading, Virtual Function, Inheritance (Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance), Virtual Base Class, Abstract Class.

Text books:

1. Object Oriented programming with C++ : E. Balaguruswami.
2. Success with C++: Kris James.
3. Object Oriented programming with C++: David Parsons.
4. Programming in C++: D. Ravichandran.
5. Programming in C++: Dewhurst and Stark.
6. Mastering C++: Venugopal, Ravishankar, Rajkumar.

B.Sc/DS/SM/DSC/2/106 : Object Oriented Programming With C++ (Lab-Work)							
Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	04	Practical	50	-	3 Hours	Practical/ Viva-voce
<p>Instructions to paper setter for Term-End Examination: The Term-End examination shall be conducted by a panel of one external and one internal examiner. The question paper for practical examination shall be set on the spot.</p>							

B.Sc/DS/SM/DSC/2/107 : Data Structure With C							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	2	2	Lecture	35	15	02 Hours	TEE/MTE/ Assignment/ Attendance

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

Unit 1

Data Structure and algorithm preliminaries: Definitions, Time and Space analysis of Algorithms, Time-Space Tradeoffs, Mathematical Notation and functions, Asymptotic Notations for complexity of algorithms, Recursion, Divide and Conquer Strategy

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

Stack -Implementing of stack; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack.

Unit 2

Queues- Operation on Queues, Circular queue, Priority queues and dequeue.

Linked list – Single, Double, Circular Linked List Implementation.

Searching, Sorting: Searching –Linear Search, Binary Search. Sorting- Bubble sort, Selection sort, Insertion sort, Merge Sort ,Quick Sort.

Reference Books:

1. Seymour Lipschutz, Data Structures, McGraw-Hill Book Company, Schaum's Outline series, NewYork (1986).
2. Narasimha Karumanchi, Data Structures And Algorithms Made Easy, Career Monk.

B.Sc/DS/SM/DSC/2/108 : Data Structure With C (Lab-Work)

Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
DSC	02	04	Practical	50	-	3 Hours	Practical/ Viva-voce

Instructions to paper setter for Term-End Examination: The Term-End examination shall be conducted by a panel of one external and one internal examiner. The question paper for practical examination shall be set on the spot.

B.Sc/DS/SM/MIC/2/103 : Information Technology							
Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
MIC	02	02	Lecture	35	15	2 Hours	TEE/MTE/Assignment/Attendance
<p>Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.</p>							

Unit 1

Introduction: Computer, evolutions and classification, components.

Software: Introduction, types of software, operating system and its types, languages and its types, translator and its types.

Hardware: Introduction, types, pointing and positioning devices, firmware.

Input devices: keyboard, point and draw devices, direct data input devices.

Output devices: hard and soft copy (CRT and Flat panel display) output devices.

Number System: Binary number, octal number, Decimal number &Hexadecimal.

Unit 2

Program planning tools: Programming languages, Flowcharts, Algorithms, Pseudo code, decision table, and decision tree.

Networks: Introduction, Internet, Local and Wide Area Networks, Wireless Networking, A Brief Introduction of Network Models and Protocols.

Web: Introduction, A Brief History of Web, Web Server, Web Browser, URLs, Basics of Static and Dynamic Web Pages, Web Search Engine and Web Services.

Text Books:

1. Wang, Paul S. From Computing to Computational Thinking. United Kingdom, CRC Press, 2017.
2. Riley, David D., and Hunt, Kenny A. Computational Thinking for the Modern Problem Solver. United States, Taylor & Francis, 2014.

Reference Books:

1. Kanetkar, Yashavant. Let Us C Solutions. India, BPB Publications, 2018.
2. Forouzan, Behrouz, and Fegan, Sophia Chung. Data Communications Networking McGraw-Hill.
3. Rivest, Ronald L., et al. Introduction to Algorithms. United Kingdom, McGraw-Hill, 2009.
4. Data Structures and Algorithms. India, Pearson Education.

B.Sc/DS/SM/MIC/2/104 : Information Technology (Lab-Work)

Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
MIC	02	04	Practical	50	-	3 Hours	Practical/ Viva-voce

Instructions to paper setter for Term-End Examination: The Term-End examination shall be conducted by a panel of one external and one internal examiner. The question paper for practical examination shall be set on the spot.

B. Sc/DS/SM/2/MDC/102 : Cyber Space								
Course Type	Course Component	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
					External	Internal		
MDC	Theory	03	03	Lecture	50	25	3 Hours	TEE/MTE/Assignment / Attendance

Instructions to paper setter for Term-End Examination: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will be set unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Course Objectives: Objective of this course is to make the students familiar with the functioning of the Internet, email, web-browsers, and e-commerce; surfing the Internet and downloading contents therefrom; legal and payment issues in e-commerce.

Course Outcomes	At the end of this course, the student will be able to:
CO1	define: Internet and its applications, ISP, HTML, Email, Web Browsers, Social Media and E-commerce.
CO2	explain: internet, intranet, internet service provider, HTML, structure and working of email, configuration of mail client like Outlook Express with mail server, functionality of web browsers, social media and concept of E-commerce.
CO-3	illustrate: internet and its applications, evolution of internet, structure of HTML, various tags with their uses in HTML, structure and working of email, concept and use of different type of web browser, searching and downloading from websites, use of social media and introduction to E-commerce
CO4	categorize: applications of internet, ISP, HTML elements, email messaging, function of web browsers, searching software's, various social media networks, their impact and issues and concept of e-commerce with payment issues.
CO5	compare: internet and intranet, different internet service providers on the basis of their service, email advantages and disadvantages, working of various web browsers and social media types.
CO6	design: various types of HTML application with the help of different elements along with their attributes and development of webpages.

Course Content	
MDC: Introduction to Cyber Space	
Unit - I	Basics of internet and Intranet, Applications of Internet, Evolution of Internet, Internet Service Provider (ISP). Introduction to HTML, Structure of HTML, Web Page, Head and Body Sections, General structure of HTML tags-starting and ending a tag, various text

	formatting tags in HTML, Adding images, audio and video objects, Hyper linking.
Unit - II	Email: Basic Introduction, Advantages and Disadvantage, Structure of an E-Mail Message, Working of E-Mail (sending & receiving messages), Managing Email (creating new folders, deleting messages, forwarding messages, filtering messages), Configuration of Outlook Express.
Unit - III	<p>Introduction to the Functionality of Web Browsers: Internet Explorer, Netscape Navigator Concept of WWW, surfing through web sites. Web Browsing (opening, viewing, saving a web page and book mark). Searching and downloading of different sites and software.</p> <p>Introduction to Social Media: Twitter, Facebook, YouTube, Whatsapp, LinkedIn, their advantages/disadvantages and issues.</p> <p>Introduction to E-commerce, its history, advantages, challenges, payment issues, legal issues.</p>
Text/Reference Books	
Text Books	<ol style="list-style-type: none"> 1. Ritendra Goel, "e-commerce", New Age International Publisher, 2008 2. Dougals E. Comer, "Computer Network and Internet", Pearson, 2008 3. Thomas A. Powell, "HTML - The Complete Reference", Tata McGraw-Hill, ISBN: 0074633325 4. Khurana R., "HTML", APH Publishing
Reference Books	<ol style="list-style-type: none"> 1. Oliver Heathcote, "Internet Right From The Start" BPB Publications

English-I
Communicative English-1
Course Code: ENG/AEC/101

Credits: 2
Duration of Examination: 2 Hrs

Internal Assessment: 15
Semester End Examination: 35
Total Marks: 50

Course Objective: The course aims to introduce students to the theory, fundamentals and tools of communication and to develop effective communication skills for personal, social and professional interactions. Besides, the students shall learn the basics of English grammar and language.

Course Learning Outcomes:

- i) They will learn the importance and basics of communication
- ii) They will learn to receive, comment and respond to correspondences in English language.
- iii) They will learn to use English in their life practically.

Note for the Paper Setter: The question paper will consist of **five** questions in all. The **first** question will be compulsory and will consist of **seven** short questions of **1** mark each covering the whole syllabus. In addition, **four** more questions of **14** marks each will be set unit-wise comprising of **two** questions from each of the **two** units. The candidates are required to attempt **one** compulsory question and **two** more questions selecting at least **one** question from each unit.

Unit - I: Listening, Reading and Speaking Skills

Definition, The Listening Process; Importance of Listening; Basic Types of Listening; Barriers to Effective Listening, Reading Comprehension, Intonation, Group Discussion, Interview

Unit II: Writing Skills:

- Report Writing
- Paragraph Writing
- Letter Writing
- E-Mail
- Resume
- Blogs and Comments on Social Media

Suggested Reading:

- I) Kumar, Sanjay and Pushp Lata. 2015. *Communication Skills*. Second Edition, New Delhi: Oxford University Press (OUP).
- II) Sethi, J. and P.V. Dhamija. 2006. *A Course in Phonetics and Spoken English*. Second Edition. New Delhi: Prentice-Hall of India.
- III) Balasubramanian. T. *A Text Book of English Phonetics for Indian Students*. Chennai: Macmillan Publishers India Ltd., 1981.
- IV) *On Track: English Skills For Success* by Orient Blackswan (Board of Editors, Solapur University).

B.Sc/DS/SM/2/SEC/102 : Cyber Laws and Computing Ethics							
Course Type	Course Credit	Contact Hours/ Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
SEC	03	03	Lecture	50	25	3 Hours	TEE/MTE/ Assignment/ Attendance
<p>Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will be set unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.</p>							
Course Content: Cyber Laws and Computing Ethics							
Unit I	Cyber laws in general, IT Act 2000 and its amendments, various provisions of IT Act to deal with cyber offences and cybercrimes. Case of Section 66A of IT Act 2000.						
Unit II	Cybercrime: classification and typography, statistics, and issues; review of Indian cyber security strategy, privacy issues.						
Unit III	Intellectual Property: Copy rights, Patents, Trade Secret Laws, Key Intellectual property issues, Plagiarism, Competitive Intelligence, Cybersquatting, Information warfare policy. Ethics in business world, Ethics in IT, Ethics for IT professionals and IT users, IT professional malpractices, communications eavesdropping, ACM ethics code.						
Text/Reference Books							
Text Books	George Reynolds, "Ethics in information Technology", 5e, Cengage Learning. Debra Johnson, "Computer Ethics", 3e, Pearson Education. Sara Baase, "A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet," PHI Publications. Mike W Martin and Roland Schinzinger, Ethics in Engineering, Tata McGraw Hill, 2003.						
Reference Books	Michael Cross, Norris L Johnson, Tony Piltzecker, Security, Shroff Publishers and Distributors Ltd. Hon C Graff, Cryptography and E-Commerce - A Wiley Tech Brief, Wiley Computer Publisher, 2001. Govindarajan M, Natarajan S, Senthil Kumar V S, Engineering Ethics, Prentice Hall of India, 2004.						

CDLU/VAC/101 : Communication Skills

Course Type	Course Credit	Contact Hours/Week	Delivery Mode	Maximum Marks		Exam Duration	Assessment Methods
				External	Internal		
VAC	2	02	Lecture	35	15	02 Hours	TEE/MTE/Assignment/Attendance

Note for the Paper Setter: The question paper will consist of **five** questions in all. The first question will be compulsory and will consist of **seven** short questions of **1** marks each covering the whole syllabus. In addition, **four** more questions of **14 marks each** will be set unit-wise comprising of **two** questions from each of the **two** units. The candidates are required to attempt **one compulsory question** and **two more questions** selecting at least one question from each unit.

Course Objective: The main aim of the course is to build competence in English grammar and vocabulary and to enhance effective communication by developing Reading, Writing, Listening and Speaking skills of students.

Course Content: Communication Skills

Unit I

Fundamentals of Communication Skills Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing, Technical Communication, Tools of Effective Communication.

Writing Skills Basics of Grammar – Placing of Subject and Verb, Parts of Speech, Uses of Tenses, Active- Passive, and Narration.

Vocabulary Building and Writing

Word Formation & Synonyms, Antonyms, Words Often Confused, One-Word Substitutes, Idioms and Phrasal Verbs, Abbreviations of Scientific and Technical Words.

Unit II

Speaking Skills

Introduction to Phonetic Sounds & Articulation, Word Accent, Rhythm and Intonation, Interpersonal Communication, Oral Presentation, Body Language and Voice Modulation (Para linguistics and Non- Verbal), Negotiation and Persuasion, Group Discussion, Interview Techniques (Telephonic and Video Conferencing).

Technical Writing

Job Application, CV Writing, Business Letters, Memos, Minutes, Notices, Report Writing & Structure, E-mail Etiquette, Blog Writing.

Text/Reference Books

1. "The Essence of Effective Communication", Ludlow R. and Panton F., Pubs: Prentice Hall,1992
2. "Effective Communication Skills", Kulbhushan Kumar, Khanna Publishing House, 2019.
3. "A University Grammar of English", Quirk R. and Sidney G., 3rd Edition, Pubs: PearsonEducation, 2008
4. "High School English Grammar", Wren and Martin, Pubs: S. Chand & Company Ltd, 2007
5. "Essentials of Business Communication", Guffrey M.E., 8th Edition, Pubs: South-WesternCollege Publishing, 2009
6. "Technical Communication: Principles and Practice", Raman M. and Sharma S., 2ndEdition, Pubs: Oxford University Press, 2012
7. "Effective Business Communication", Rodrigues M.V., Pubs: Concept PublishingCompany, Delhi, 2003
8. "English Vocabulary in Use", McCarthy M. and Felicity O' Dell, 2nd Edition, Pubs:2010