

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

Scheme and Syllabus of
Skill Enhancement Courses (SECs) for Central Pool for
1st semester of NEP based Undergraduate Programmes
w.e.f. Academic Session 2023-24

Semester – I									
Course Code	Course Title	Credit	L : T :P: CH	Internal Marks		External Marks		Total Marks	
				Th	Pr	Th	Pr	Min	Max
B23-SEC-101	Office and spreadsheet Tools Learning	3	2 : 0 : 1 : 4	15	05	35	20	30	75
B23-SEC-102	Advance Spreadsheet Tools	3	2 : 0 : 1 : 4	15	05	35	20	30	75
B23-SEC-103	Basic IT Tools	3	2 : 0 : 1 : 4	15	05	35	20	30	75
B23-SEC-104	Essentials of Python	3	2 : 0 : 1 : 4	15	05	35	20	30	75
B23-SEC-105	Introductory Course in R	3	2 : 0 : 1 : 4	15	05	35	20	30	75
B23-SEC-106	Computer Programming in C	3	2 : 0 : 1 : 4	15	05	35	20	30	75



B23-SEC-101 Office and spreadsheet Tools Learning

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. To understand the basic concepts of operating systems
2. To do the basic editing and formatting in a document
3. To create basic spread-sheets for different purposes
4. To create basic presentations for different applications

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Operating System - Definition, Functions, Types of Operating System, Basics of Popular Operating Systems, The User Interface, Exploring Computer, Icons, taskbar, desktop, Using Menu and Menu-selection, managing files and folders, Control panel – display properties, add/remove software and hardware, Common utilities.

UNIT-II

Word Processing - Introduction to Word Processing, Menus, Creating, Editing & Formatting Document, Spell Checking, Printing, Views, Tables, Word Art, Mail Merge, Macros, Inserting hyperlinks, Searching for text, Modifying page setup, Applying document themes, Applying document style sets, Inserting headers and footers.

UNIT-III

Spread Sheet: Elements of Electronics Spread Sheet, Applications, Creating and Opening of Spread Sheet, Menus, Manipulation of cells: Enter texts numbers and dates, Cell Height and Widths, Copying of cells, Mathematical, Statistical and Financial function, Drawing different types of charts, Sort and Filter Data.

UNIT-IV

Presentation Software: Creating, Modifying and enhancing a presentation, Type of presentation views, Using sound, Animation, Working with Objects, Printing.

UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Help files from Apache Open Office, <https://wiki.openoffice.org/wiki/Documentation>
2. Channelle Andy, "Beginning OpenOffice 3: From Novice to Professional", aPress Publications
3. Beginning OpenOffice 3: From Novice to Professional, Andichannele, Apress.
4. Microsoft Office 2016 Step by Step: MS Office 2016 Step by Step, By Joan Lambert, Curtis Frye
5. Computer Fundamentals - By Pradeep K. Sinha, Priti Sinha, BPB Publications, 6th Edition
6. Getting Started with LibreOffice 5.0, Friends of OpenDocuments Inc.,
7. [Http://friendsofopendocument.com](http://friendsofopendocument.com)
8. Documentation from LibreOffice, <https://documentation.libreoffice.org/en/english-documentation/>



B23-SEC-102 Advance Spreadsheet Tools

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. To create and format spreadsheets
2. To create and format tables and applying formulas in a spreadsheet
3. To create charts and protect worksheets
4. To create and use pivot charts and tables

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Manage Workbook Options and Settings: Create Worksheets and Workbooks, navigate in Worksheets and Workbooks, Format Worksheets and Workbooks, Customize Options and Views for Worksheets and Workbooks, Configure Worksheets and Workbooks for Distribution

Apply Custom Data Formats and Layouts: Apply Custom Data Formats and Validation, Apply Advanced Conditional Formatting and Filtering, Create and Modify Custom Workbook Elements

UNIT-II

Create Tables: Create and Manage Tables, Manage Table Styles and Options, Filter and Sort a Table

Perform Operations with Formulas and Functions: Summarize Data by using Functions, Perform Conditional Operations by using Functions, Format and Modify Text by using Functions.

UNIT-III

Create Charts and Objects: Create Charts, Format Charts, Insert and Format Objects

Manage Workbook Options and Settings: Manage Workbooks, Manage Workbook Review Restrict editing

UNIT-IV

Create Advanced Formulas: Apply Functions in Formulas, Look up data by using Functions, Apply Advanced Date and Time Functions, Perform Data Analysis and Business Intelligence, Define Named Ranges and Objects,

Create Advanced Charts and Tables: Create and Manage PivotTables, Create and Manage Pivot Charts

UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Help files from Apache Open Office, <https://wiki.openoffice.org/wiki/Documentation>
2. Channelle Andy, "Beginning OpenOffice 3: From Novice to Professional", aPress Publications
3. Beginning OpenOffice 3: From Novice to Professional, Andichannele, Apress.
4. Microsoft Office 2016 Step by Step: MS Office 2016 Step by Step, By Joan Lambert, Curtis Frye
5. Getting Started with LibreOffice 5.0, Friends of OpenDocuments Inc.,
6. [Http://friendsofopendocument.com](http://friendsofopendocument.com)
7. Documentation from LibreOffice, <https://documentation.libreoffice.org/en/english-documentation/>
8. Walter Holland, Microsoft Office 2013 Digital Classroom
9. Wayne L. Winston, Data Analysis and Business Modeling



B23-SEC-103 Basic IT Tools

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. To identify the basic components of computers and terminology
2. To acquaint with Operating System and its applications for both desktop and mobile devices
3. To Understand computer networks, and browse the internet, content search, email and collaborate with peers
4. To use e-Governance applications; and use computer to improve existing skills and learn new skills

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to Computer: Computer and Latest IT gadgets, Evolution of Computers & its applications, Basics of Hardware and Software, Application Software, Systems Software, Utility Software. Central Processing Unit, Input devices, Output devices, Computer Memory & storage, Mobile Apps.

UNIT-II

Introduction to Operating System, Functions of the Operating system, Operating Systems for Desktop and Laptop, Operating Systems for Mobile Phone and Tablets, User Interface for Desktop and Laptop, Task Bar, Icons & shortcuts, Running an Application, Operating System Simple Setting, Changing System Date and Time, Changing Display Properties, To Add or Remove Program and Features, Adding, Removing & Sharing Printers, File and Folder Management.

UNIT-III

Introduction to Internet and World Wide Web, Basic of Computer Networks, Local Area Network (LAN), Wide Area Network (WAN), Network Topology, Internet, Applications of Internet, Website Address and URL, Popular Web Browsers (Internet Explorer/Edge, Chrome, Mozilla Firefox, Opera etc.), Popular Search Engines, Searching on the Internet.

UNIT-IV

E-mail: Using E-mails, Opening Email account, Mailbox: Inbox and Outbox, Creating and Sending a new E-mail, replying to an E-mail message, forwarding an E-mail message, searching emails, Attaching files with email, Email Signature. Social Networking: Facebook, Twitter, LinkedIn, Instagram, Instant Messaging (WhatsApp, Facebook Messenger, Telegram), Introduction to Blogs, Digital Locker.

UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB
2. Dromey, R.G., How to Solve it By Computer, PHI
3. Norton, Peter, Introduction to Computer, McGraw-Hill
4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
5. Rajaraman, V., Fundamentals of Computers, PHI
6. Ram, B., Computer Fundamentals, Architecture & Organization, New Age International (P) Ltd.



B23-SEC-104 Essentials of Python

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. *To understand the basic concepts of Python*
2. *To learn the syntax and semantics of Python Programming Language.*
3. *To Illustrate the process of structuring the data using lists, tuples and dictionaries.*
4. *To write Python functions to facilitate code reuse and manipulate strings.*

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Keywords and Identifiers; Comments: Purpose/use of comments, Single line comment/Multiline comment; Python Variables: Declaration of Variables, Assign Values to Variables, Initialization, Reading, Variable naming restrictions, and Types of Python Variables.

Python Data Types: Implicit Declaration of Data Types, Python Numbers (Integers, floating-point numbers, and complex numbers), Python Strings, Python Boolean data type;

UNIT-II

Operators: Arithmetic, Comparison/Relational Operators, Increment Operators, Logical operators, Identity Operators, and Operators Precedence.

Python Control Flow Statement, Decision Making: Simple If Structure, if-else structure, if elif structure, and nested If Structure;

UNIT-III

Looping: Python Loop Statements. Python while loop, Python for loop, Python range(), Python Nested Loop Structures, and Inserting conditions in Loops and vice versa; Python Branching Statements – break, continue, pass.

Python Lists: Create Python Lists, Update Python Lists, Delete Elements from Python Lists, and Built-in Functions Methods for Python Lists.

UNIT-IV

Tuples: create, update, join and methods; Sets: create, add/remove items, join sets, set methods;

Dictionary: create, access, add/remove items, dictionary methods.

Manipulating

Strings - Working with Strings, Useful String Methods

Python Functions: defining function, arbitrary arguments, keywords arguments, default parameter values, return value and return statements; Lambda; Arrays: looping through array elements, array methods;

UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies based on Python during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015, ISBN: 978-9352134755.
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, WileyIndia Pvt Ltd. ISBN-13: 978-8126556014.
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Reema Thareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173
5. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278

B23-SEC-105 Introductory Course in R

Max. Marks: 75

Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]

External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. To describe the features of R Programming.
2. To use the various data structures in R.
3. To apply data frames, control statements and functions for the simulation.
4. To identify the statistical methods applied in R.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introducing to R, Installation of Libraries; Constants and Variables; Numbers; R Data Structures, Help functions in R. Vectors: Numeric Vectors, Scalars, Declarations
Vectorized operation: Using all and any, NA and NULL values, Filtering, Vectorized if-thenelse, Vector Equality, Vector Element names, Arithmetic and Boolean operations, conditional and loop statement in R.

UNIT-II

Functions and Recursions in R, Packages in R;
Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns: Adding and deleting rows and columns, Higher Dimensional arrays; Vector/Matrix Distinction; Avoiding Dimension Reduction; Characters and Strings; String vector; String operations and functions.

UNIT-III

List: Creating lists, General list operations, accessing list components and values, applying functions to lists, recursive lists, Different R operations using a List, matrix, Array;
Overview on Data Frames: Create it in scratch, Matrix-like operations in frames, Merging Data Frames, Applying functions to Data frames.

UNIT-IV

Factors and Tables: factors and levels, Common functions used with factors, working with tables, Math and Simulations in R, reading a datafile directly into a dataframe, EDA using R, Reading different file formats.
Input/Output: reading and writing files, String Manipulation. Statistical analysis: Basic Statistical function, Linear Model, R functions for statistical analysis

UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies based on Python during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Norman Matloff, “The Art of R Programming: A Tour of Statistical Software Design”, NoStarch Press, 2011
2. Jared P. Lander, “R for Everyone: Advanced Analytics and Graphics”, Addison-Wesley Data& Analytics Series, 2013.
3. Mark Gardener, “Beginning R – The Statistical Programming Language”, Wiley, 2013
4. Robert Knell, “Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R”, Amazon Digital South Asia Services Inc, 2013.



B23-SEC-106 Computer Programming in C

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. To understand the basic concepts of C Programming
2. To develop programming capability to design programs as well as real life applications using C language.
3. To cover the concept of core programming like how to implement functions, arrays and how to manage data in files using different operations.
4. To understand various header Files.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to C: Data Types: Primitive Data types, Derived Data types, User-Defined Data Types;
Operators: Different Types of Operators, Precedence of Operators, Expression and Statements;
Token: Variables, Constants, Literals, Identifiers, Keyword, Escape Sequence;
Types of Conversion: Typecasting, Conversion.

UNIT-II

Decision Control Statements: IF, IF-ELSE, Nested IF, IF- ELSE ladder, Switch-case;
Iterative statements: FOR loop, WHILE loop, DO-WHILE loop;
Jump Statements: Break, Continue.

UNIT-III

Array: Declaration of an Array, Initialization of Array, Type of Array: Single Dimension Array, Two-Dimensional Array; Address Calculation of an Element in Array.
Character Array and Strings: Reading, writing, String Handling Functions: strcat(), strcmp(), strcpy(), strlen().

UNIT-IV

Functions: User-Defined Functions; Function Declaration; Types of Arguments: Actual Arguments, Formal Arguments; Function Definition; Methods to Call a Function: Call by Value, Call by Reference; Passing Arrays as Parameters.
Storage classes: Automatic, Register, Static, and External
Structures; Unions; Enumerations.

UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies based on C language during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2002
2. E. Bala Guruswamy, "Programming in ANSI C", TMH, 1999.
3. Al Kelly and Ira Pohl, "A Book on C", (4th Ed.), Addison Wesley, 1999.
4. B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI, 2000.
5. Kernighan & Ritchie, "The C Programming Language ANSI C Version", Prentice Hall Software Series
6. Herbert Schildt "ANSI C - Made Easy", Osborne McGraw-Hill

