CH. BANSI LAL UNIVERSITY, BHIWANI, HARYANA

Scheme of Examination for Under-Graduate Programmes

Skill Enhancement Courses (SEC)

(Computer Science)

Offered by Department of Information and Communication Technology

According to

Curriculum Framework for Under-Graduate Programmes

As per NEP-2020

(Multiple Entry-Exit, Internships and Choice Based Credit System)

Scheme of Examination for Undergraduate Programmes

Skill Enhancement Courses (Computer Science)

According to Curriculum Framework for Undergraduate Programmes as per NEP 2020

(Multiple Entry-Exit, Internships and Choice Based Credit System)

Sem	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs) T + P
I	SEC	24UN-ICT-SEC101	Office and Spreadsheet Tools Learning	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
	SEC	24UN-ICT-SEC102	Advance Spreadsheet Tools	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
	SEC	24UN-ICT-SEC103	Basic IT Tools	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
	SEC	24UN-ICT-SEC104	Essentials of Python	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
	SEC	24UN-ICT-SEC105	Introductory Course in R	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
II	SEC	24UN-ICT-SEC201	Cloud Computing Skills	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
	SEC	24UN-ICT-SEC202	Internet and Web Technologies	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
III	SEC	24UN-ICT-SEC301	Advance IT Skills	2	2	15	35	50	3
			Practical	1	2	5	15	20	3
VI	SEC	24UN-ICT-SEC601	Data Management	2	2	15	35	50	3
			Practical	1	2	5	15	20	3

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	I		
Name of the Course	Office and spreadsheet Tools Learning		
Course Code	24UN-ICT-SEC101		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand the basic concepts of operating systems 2. do the basic editing and formatting in a document 3. create basic spread-sheets for different purposes 4. create basic presentations for different applications 5*. to understand the working of operating system and various office tools practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks: 55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	
Part B-Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			

Unit	Topics	Contact Hours
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.	4
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.	7
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.	7
IV	Presentation Software: Creating, Modifying and enhancing a presentation, Type of presentation views, Using sound, Animation, Working with Objects, Printing.	7
V*	Practicum: Operating System: • Starting with basics of Operating Systems and its functionalities Word Processing: • Create and format word documents. • Use tables, word Art and other features in your documents. • Use macros to simplify the tasks in a document. • Use mail merge to write once for many. Spread Sheet: • Use spreadsheet for basic data handling • Apply formulas to sheet for automation. • Use Charts & Shapes for better visualization of the data. • Use sorting and filtering of the data Presentation Software: • Prepare and format presentations. • Apply slide transitions, animations and sequencing for slides. • Apply different formatting and insert options to make presentation better. • Appling sound and animation.	25

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory** • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.: 4 • Mid-Term Exam: 7	**End Term Examination:** A three hour exam for both theory and

➢ **Practicum** • Class Participation: 2 • Seminar/Demonstration/Viva-voce/Lab records etc.: 3 • Mid-Term Exam: NA	practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

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

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	I		
Name of the Course	Advance Spreadsheet Tools		
Course Code	24UN-ICT-SEC102		
CourseType: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annex-ure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. create and format spreadsheets 2. create and format tables and applying formulas in a spreadsheet 3. create charts and protect worksheets 4. create and use pivot charts and tables 5*. to implement various spreadsheet tools practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks:55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	
Part B-Contents of the Course			

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

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

Unit	Topics	Contact Hours
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	6
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.	6
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	6
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	6
V*	Practicum: Spread Sheet: • Use spreadsheet for basic data handling • Apply formulas to sheet for automation. • Use if-else to make certain decisions in a sheet. • Use Charts & Shapes for better visualization of data. • Use filters and data validation controls for control of data • Formatting data and spreadsheets • Creating and managing tables • Use Pivot table and charts • Use what-if analysis along with goal seek and scenarios	25

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory** • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.:4 • Mid-Term Exam: 7 ➢ **Practicum** • Class Participation: 2	**End Term Examination:** A three hour exam for both theory and practicum.

• Seminar/Demonstration/Viva-voce/Lab records etc.:3 • Mid-Term Exam: NA	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

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

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	I		
Name of the Course	Basic IT Tools		
Course Code	24UN-ICT-SEC103		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annex-ure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Identify the basic components of computers and terminology 2. acquaint with Operating System and its applications for both desktop and mobile devices 3. Understand computer networks, and browse the internet, content search, email and collaborate with peers 4. Use e-Governance applications; and use computer to improve existing skills and learn new skills 5*. to implement various spreadsheet tools practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks:55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	
Part B-Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.
Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
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.	6
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.	6
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.	6
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.	6
V*	Practicum: • Identify the various parts of computer • Using computer/mobile software and hardware • Use of operating system for various tasks such as file creation, directory creation, shortcut creation, using control panel, etc. • Using Internet & various browsers. • Identify the various hardware/software required for Internet • How to create and use e-mail account • Using Facebook, WhatsApp, Instagram, LinkedIn, Telegram • Writing blogs	25

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory**	**End Term Examination:** A three hour ex-

• Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.:4 • Mid-Term Exam: 7 ➢ **Practicum** • Class Participation: 2 • Seminar/Demonstration/Viva-voce/Lab records etc.:3 • Mid-Term Exam: NA	am for both theory and practicum.
PartC-Learning Resources	
Recommended Books/e-resources/LMS: • Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB • Dromey, R.G., How to Solve it By Computer, PHI • Norton, Peter, Introduction to Computer, McGraw-Hill • Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World • Rajaraman, V., Fundamentals of Computers, PHI • Ram, B., Computer Fundamentals, Architecture & Organization, New Age International (P) Ltd.	

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	I		
Name of the Course	Essentials of Python		
Course Code	24UN-ICT-SEC104		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Understand the basic concepts of Python 2.Learn the syntax and semantics of Python Programming Language. 3. Illustrate the process of structuring the data using lists, tuples and dictionaries. 4. Write Python functions to facilitate code reuse and manipulate strings. 5*. Understand the basic concepts of Python Programming practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks:55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	

Part B-Contents of the Course

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of

three-hour duration.		
Unit	**Topics**	**Contact Hours**
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;	6
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;	6
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.	6
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;	7
V*	Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: • Write a program to compute distance between two points taking input from the user (Pythagorean Theorem). • Write a program add.py that takes 2 numbers as command line arguments and prints its sum. • Write a Program for checking whether the given number is an even number or not. • Using for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, ..1/10. • Create a list and perform the following methods (a) insert() (b) remove() (c) append() (d) len() (e) pop() (f) clear() • Create a dictionary and apply the followingmethods: (a) Print the dictionary items (b) access items	25

(c) useget() (d) change values (e) use len()

- Create a tuple and perform the following methods:
  (a) Add items (b) len() (c) check for item in tuple (d) Access items
- Write a python program to print a number is positive/negative using if-else.
- Write a python program to find largest number among three numbers.
- Write a python Program to read a number and display corresponding day using if_elif_else?
- Write a program to create a menu with the following options:
  (a) TO PERFORM ADDITITON (b) TO PERFORMSUBTRACTION (c) TO PERFORM MULTIPICATION (d) TOPERFORM DIVISION
- Accepts users input and perform the operation accordingly. Use functions with arguments.
- Write a python program to check whether the given string is palindrome or not.
- Write a python program to find factorial of a given number using functions
- Write a Python function that takes two lists and returns True if they are equal otherwise false.
- Demonstrate a python code to print try, except and finally block statements.
- Write a Python script that prints prime numbers less than 20.
- Write a python program to find factorial of a number.

Suggested Evaluation Methods

Internal Assessment:

➢ **Theory**

- Class Participation: 4
- Seminar/presentation/assignment/quiz/class test etc.:4
- Mid-Term Exam: 7

➢ **Practicum**

- Class Participation: 2
- Seminar/Demonstration/Viva-voce/Lab records etc.:3
- Mid-Term Exam: NA

End Term Examination:
A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition,Green Tea Press, 2015, ISBN: 978-9352134755.
- Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, WileyIndia Pvt Ltd. ISBN-13: 978-8126556014.
- Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson EducationIndia, 2015. ISBN-13: 978-9332555365.
- ReemaThareja, "Python Programming using problem solving approach", Oxfor-

dUniversity press, 2017. ISBN-13: 978-0199480173
- Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3",1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	I		
Name of the Course	Introductory Course in R		
Course Code	24UN-ICT-SEC105		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1.Describe the features of R Programming. 2. Use the various data structures in R. 3. Apply data frames, control statements and functions for the simulation. 4. Identify the statistical methods applied in R. 5*. understand the basic concepts of R Programming practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks:55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	

Part B-Contents of the Course

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

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

Unit	Topics	Contact Hours
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-then else, Vector Equality, Vector Element names, Arithmetic and Boolean operations, conditional and loop statement in R.	6
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.	6
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.	6
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	6
V*	Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: • Perform arithmetic operations in R. • Demonstrate the process of creating a user defined function in R. • Perform logical operations in R. • Implement Loops with different examples. • Learn the basics of functions in R and implement with examples. • Implement data frames in R. Write a program to join columns and rows in a dataframe using cbind() and rbind() in R. • Implement different String Manipulation functions in R. • Implement different data structures in R (Vectors, Lists, Data Frames) • Write a program to read a csv file and analyze the data in the file in R • Create a data set and do statistical analysis on the data using R	25

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory** • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.:4 • Mid-Term Exam: 7 ➢ **Practicum** • Class Participation: 2 • Seminar/Demonstration/Viva-voce/Lab records etc.:3 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for both theory and practicum.

Part C-Learning Resources
Recommended Books/e-resources/LMS: • Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", NoStarch Press, 2011 • Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data& Analytics Series, 2013. • Mark Gardener, "Beginning R – The Statistical Programming Language", Wiley, 2013 • Robert Knell, "Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R", Amazon Digital South Asia Services Inc, 2013.

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	II		
Name of the Course	Cloud Computing Skills		
Course Code	24UN-ICT-SEC201		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Get acquainted with the term Cloud computing. 2. Understand various types of free and commercial clouds. 3. Understands various types of cloud services like SaaS. PaaS and IaaS. 4. Know how the Cloud Computing is changing software industry 5*. to create and use Cloud.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks: 55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	
Part B- Contents of the Course			

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

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

Unit	Topics	Contact Hours
I	Basic Concepts of Cloud Computing Computer Network Basics. Concepts of Distributed Systems. Concepts of Cloud Computing and its Necessity. Cloud Service Providers in use and their Significance.	6
II	Cloud Infrastructure Cloud Pros and Cons. Cloud Delivery Models. Cloud Deployment Models.	6
III	Cloud Storage Management Concept of Virtualization and Load Balancing. Overview on Virtualization used for Enterprise Solutions. Key Challenges in managing Information. Identifying the problems of scale and management in big data.	6
IV	Building Cloud Networks Designing and Implementing a Data Center-Based Cloud Installing Open Source Cloud service. Amazon Web Services (AWS). Google Cloud Platform.	6
V*	Practicum: • Creating & using Amazon(AWS) Account • Creating & using Google Account	25

Suggested Evaluation Methods

Internal Assessment:

➢ **Theory**
- Class Participation: 4
- Seminar/presentation/assignment/quiz/class test etc.: 4
- Mid-Term Exam: 7

➢ **Practicum**
- Class Participation: 2
- Seminar/Demonstration/Viva-voce/Lab records etc.: 3
- Mid-Term Exam: NA

End Term Examination: A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Cloud Computing: Concepts, Technology & Architecture By Thomas Erl, Ricardo
- Cloud computing a practical approach Anthony T.Velte, Toby J.Velte Robert Elsenpeter, TATA McGraw-Hill, New Delhi– 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online -Michael Miller-Que2008
- Moving to Cloud by Dinkar Sitaram, Geetha Manjunath, Publication: Syngress Elsevier Inc, 2014(2ndEdition)
- Cloud Computing Second Edition by Dr Kumar Saurabh, Publication Willy INDIA (2013)
- Cloud Computing Bible by Barrie Sosinsky, Publisher Willy INDAI (2014)
- Cloud computing for Dummies-Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing(Principles and Paradigms),Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

Session: 2024-25			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	II		
Name of the Course	Internet and Web Technologies		
Course Code	24UN-ICT-SEC202		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Analyze a web page and identify its elements and attributes. 2. Create web pages using X HTML and Cascading Style Sheets. 3. Build dynamic web pages using JavaScript (Client side programming). 4. Create XML documents and Schema.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks: 50(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	
Part B- Contents of the Course			

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

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

Unit	Topics	Contact Hours
I	Introduction to the Internet and the World Wide Web, Web Pages; Hyper Text Transfer Protocol (HTTP);File Transfer Protocol (FTP) Domain Names; URL; Website, Web browser, Web Servers; Web Hosting.HTML.	6
II	Introduction, Objectives, Introduction to Universal Resource Identifier (URI),History of HTML, Structure of HTML Basic Tags of HTML, Planning for designing Web pages, Model and structure for a Website, Developing Websites,. Tag; Creating Links: Link to other HTML documents and same HTML documents. List, Tables: Creating Tables,Forms.	6
III	Java Script Introduction to Scripting, JavaScript: Control Statements, JavaScript: Functions, JavaScript: Arrays JavaScript: Objects, CSS, External Style Sheets, Internal Style Sheets, Inline Style, The class selector, div & span tag.	6
IV	DOM HTML DOM, XML: Introduction; Features of XML, Dynamic HTML (DHTML), DHTML form, XML DOM.	6
V*	Practicum: 1. HTTP ii) TELNET iii) FTP iv) SMTP 2. Create your first web page using HTML basic Tags. 3. Create a web page with the following constrains I) an clickable image ii) a hyperlink to your collage web site, 4. Create your student web Form for the entry of Student's information 5. Create a complete web page using Frame 6.Validate the registration and user login in a web site using JavaScrip 7.Design a digital clock on your web page using Java script. 8. Basics of CGI scripting using Perl or C. 9. Design a digital calculator using HTML and Java script.	25

Suggested Evaluation Methods

Internal Assessment:

➢ **Theory**

- Class Participation: 4
- Seminar/presentation/assignment/quiz/class test etc.: 4
- Mid-Term Exam: 7

➢ **Practicum**

- Class Participation: 2
- Seminar/Demonstration/Viva-voce/Lab records etc.: 3
- Mid-Term Exam: NA

End Term Examination: A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar& others, Cengage Learning

Reference Books

1. Web Programming: Building Internet Applications, Chris Bates, Wiley Dreamtech
2. Programming the World Wide Web, Robert W Sebesta, Pearson
3. Web Technologies, Uttam K Roy, Oxford
4. WebTechnology:A developer perspective, Gopalan&Akilandeswari, PHI

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Advance IT Skills		
Course Code	24UN-ICT-SEC301		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Use e-Governance applications; and use computer to improve existing skills and learn new skills 2. Using internet for Digital Financial services 3. understand the concept of Cyber security and issues and challenges associated with it 4. Develop knowledge about Future Skills 5*. to understand the various concepts in the syllabi practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks: 55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	

Part B- Contents of the Course

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of

three-hour duration.		
Unit	**Topics**	**Contact Hours**
I	WWW and E-Governance - Website Address and URL, Introduction to IP, Address, ISP and Role of ISP, Internet Protocol, Modes of Connecting Internet (HotSpot, Wifi, LAN Cable, BroadBand, USB Tethering), Identifying and uses of IP/MAC/IMEI of various devices, Downloading Web Pages, Printing Web Pages Introduction to Blogs, Basics of E-commerce, Netiquettes, Overview of e-Governance Services like Railway Reservation, Passport, eHospital [ORS], Accessing e-Governance Services on Mobile	5
II	Digital Financial Tools and Applications Digital Financial Tools, Understanding OTP [One Time Password]and QR [Quick Response] Code, UPI [Unified Payment Interface], AEPS [Aadhaar Enabled Payment System], USSD[Unstructured Supplementary Service Data], Card [Credit / Debit], eWallet, PoS [Point of Sale], Internet Banking, National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), Immediate Payment Service (IMPS), Online Bill Payment	5
III	Cyber Security: Cyber Security, Defining Cyberspace, Architecture of cyberspace, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security. Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organisations dealing with Cybercrime and Cyber security in India.	7
IV	Overview of Futureskills: Introduction to Internet of Things (IoT), Big Data Analytics, Cloud Computing, Virtual Reality, Artificial Intelligence, Social & Mobile, Blockchain Technology, 3D Printing/ Additive Manufacturing, Robotics Process Automation.	7
V*	Practicum: WWW and E-Governance: • Understanding the various devices related to Internet • Using e-governance services • Writing e-blogs. Digital Financial Tool: • Using digital financial tools. Cyber Security: • Checklist for reporting cyber-crime at Cybercrime Police Station • Checklist for reporting cybercrime online • Reporting phishing emails	25

	• Demonstration of email phishing attack and preventive measures. Futuristic Technology: • Introducing various futuristic technologies.	

Suggested Evaluation Methods

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

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010.
- Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
- Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001)
- Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
- Computer Fundamentals - By Pradeep K. Sinha, Priti Sinha, BPB Publications, 6th Edition

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	VI		
Name of the Course	Data Management		
Course Code	24UN-ICT-SEC601		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Describe major components of DBMS and their functions 2. Model an application"s data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model. 3. Write queries in relational algebra / SQL 4. Normalize a given database schema to avoid data anomalies and data redundancy. 5*. to implement the concepts of databases using SQL.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:70(50(T)+20(P)) **Internal Assessment Marks:20(15(T)+5(P))** **End Term Exam Marks: 55(35(T)+15(P))**		**Time: 3 Hrs.(T), 3Hrs.(P)**	
Part B- Contents of the Course			

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First

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

Unit	Topics	Contact Hours
I	Database Management System – Introduction and Purpose, Database Architectures: Centralised, Client-Server, Parallel, Distributed, Web based system: Web architecture (2 tier, 3 tier, N-tier Architecture) Database Storage Structures: Introduction, Indexing, Hashing, Data Dictionary.	6
II	Data Models: Introduction to various data models, Cardinality Ratio & Relationships, Representation of entities, attributes, relationship attributes, relationship set, Generalization, aggregation, Structure of relational Database and different types of keys, Codd"s rules and Relational data model	6
III	Relational Database design: Basic System Development Life Cycle, Database Design – ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1NF, 2NF, 3NF)	6
IV	**SQL queries:** SQL data definition, data types, specifying constraints, Queries for retrieval, insertion, deletion, updation, introduction to views.	6
V*	Practicum: Create and use the following database schema to answer the given queries. EMPLOYEE Schema: Field Type NULL KEY DEFAULT Eno Char(3) NO PRI NIL Ename Varchar(50) NO NIL Job_type Varchar(50) NO NIL Manager Char(3) Yes FK NIL Hire_date Date NO NIL Dno Integer YES FK NIL Commission Decimal(10,2) YES NIL Salary Decimal(7,2) NO NIL DEPARTMENT Schema: Field Type NULL KEY DEFAULT Dno Integer No PRI NULL Dname Varchar(50) Yes NULL Location Varchar(50) Yes New Delhi Query List 1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first. 2. Query to display unique Jobs from the Employee Table. 3. Query to display the Employee Name concatenated by a Job separated by a comma.	25

4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don"t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is „A".
14. Query to display Name of all employees either have two „R"s or have two „A"s in their name and are either in Dept No = 30 or their Manger"s Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with „J", "A" and „M".
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30. 24. Query to display Name, Dept Name of all employees who have an „A" in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. Query to display Name and Employee no. Along with their Manger"s Name and the Manager"s employee no; along with the Employees" Name who do not have a Manager.
27. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.

	28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100. 29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees 30. Query to display the number of employees performing the same Job type functions. 31. Query to display the no. of managers without listing their names. 32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department. 33. Query to display Name and Hire Date for all employees in the same dept. as Blake. 34. Query to display the Employee No. And Name for all employees who earn more than the average salary. 35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a „T". 36. Query to display the names and salaries of all employees who report to King. 37. Query to display the department no, name and job for all employees in the Sales department	

Suggested Evaluation Methods

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

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Elmasri, R., & Navathe, S.B. (2015). Fundamentals of Database Systems. 7th edition. Pearson Education.
- Date, C. J. (2004). An Introduction to database systems. 8th edition. Pearson Education.
- Silberschatz, A., Korth, H. F., & Sudarshan, S. (2010). Database System Concepts. 6th edition. McGrawHill.

*Applicable for courses having practical component.

CH. BANSI LAL UNIVERSITY, BHIWANI HARYANA

Scheme of Examination for Under-Graduate Programmes

Value Added Courses (VAC)

Offered by Department of Information and Communication Technology

According to

Curriculum Framework for Under-Graduate Programmes

As per NEP-2020

(Multiple Entry-Exit, Internships and Choice Based Credit System)

w.e.f. 2024-2025

Sem	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs)
3	VAC	24UN-ICT-VAC301	Web Designing Lab	2	4	15	35	50	3
4	VAC	24UN-ICT-VAC401	Software Testing	2	2	15	35	50	3
	VAC	24UN-ICT-VAC402	Analytics with Python Lab	2	4	15	35	50	3

Session: 2024-25			
Part A -Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Web Designing Lab		
Course Code	24UN-ICT-VAC301		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	VAC		
Level of the course (As per Annexure-I			
Pre-requisite for the course(if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand the fundamental concepts of web development 2. understand the basic tags of HTML 3. understand the Concepts of CSS 4. create static webpages with different positioning elements 5. understand the designing of a static websites.		
Credits	Theory	Practical	Total
	-	2	2
Contact Hours	-	4	4
Max. Marks: 50 (P) **Internal Assessment Marks: 15 (P)** **End Term Exam Marks: 35 (P)**		**Time: 3 Hrs. (P)**	
Part B- Contents of the Course			
Instructions for Examiner Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			

Topics	Contact Hours
Web Programming Introduction: Architecture of a website, Different technologies in making the website; Introduction to HTML: History of HTML, Basic structure of an HTML document, Introduction to Static and Dynamic Websites, HTML Tag vs Element, HTML Attributes; HTML-Basic Formatting Tags; Grouping Using Div and Span, HTML-Lists: Unordered Lists, Ordered Lists, Definition list; Image and Image Mapping, Hyperlink. HTML-Table: < table >, <th>, <tr>, < td >, < caption >, <thead>, <tbody>, <tfoot>, <colgroup>, <col>; Colspan & Rowspan HTML-Iframe: Iframe attributes, Using Iframe as the Target; HTML-Form: Form attributes, Form elements: <input>, <textarea>. <button>, <select>, <label>,<fieldset>, <legend>etc. CSS: Introduction, Benefits of CSS, CSS Syntax, Types of CSS, CSS Selectors: Element selector, ID Selectors, Class Selectors, Grouping Selectors, Universal Selector, CSS-Pseudo Classes, pseudo element; Text Fonts: color, background-color, text-decoration, text-align, vertical-align, text-indent, text-transform, white space, letter-spacing, word-spacing, line-height; font properties: font-family, font-size, font-style, font-variant, font-weight. Lists: list-style-type, list-style-position, list-style-image, list-style Tables: border, width & height, text-align, padding, colour; CSS Box Model: Border, Margin & Padding, width & height; CSS Positioning properties: Static Positioning, Fixed Positioning, Relative Positioning, Absolute Positioning.	60
Practicum • Starting with introduction to WWW HTML: • Write a HTML document to print "Hello World" in bold and Italic Format. • Design a page having suitable background colour and text colour with title “My First Web Page” using all the attributes of the Font tag. • Write HTML code to design a page containing some text in a paragraph by giving suitable heading style. • Write HTML code to display three images at LEFT, RIGHT and CENTER respectively in web browser. • Write HTML code which contains Hyperlinks. • Program based on HTML form and frames • Design a HTML table with the use of colspan and rowspan. • Practical based on CSS	

Suggested Evaluation Methods	
Internal Assessment: ➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for practicum.
Part C- Learning Resources	
Recommended Books/e-resources/LMS: • Deitel H.M., Deitel P.J., Internet & World wide Web: How to program, Pearson Education. • Jackson, Web Technologies, Pearson Education	

Session: 2024-25			
Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	IV		
Name of the Course	Software Testing		
Course Code	24UN-ICT-VAC401		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	VAC		
Level of the course (As per Annexure-I			
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	On the completion of the course students will: 1. Understand the basic terminologies and types of testing. 2. Understand different testing methods 3. Understand the testing process 4. Manage the tests, plan testing process and create reports 5. Testing the software/projects using various techniques		
Credits	Theory	Practical	Total
	2	-	2
Contact Hours	2	-	2
Max. Marks: 50 (T) **Internal Assessment Marks: 15 (T)** **End Term Exam Marks: 35 (T)**		**Time: 3 Hrs. (T)**	
Part B-Contents of the Course			

Instructions for Paper-Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. 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. First question will be compulsory.

Unit	Topics	Contact Hours
I	Introduction: Definition of Software Testing and its Role, Terms:- Failure, Error, Fault, Defect, Bug, Goals of Testing, Principles of Testing, Software Testing Life Cycle, Verification and Validation: - V-testing Lifecycle	8
II	Types of Testing: Black Box Testing: Overview: What is & When? Techniques: Boundary Value Analysis, Equivalence class testing, Decision Table White Box Testing: What is white box Testing, Need of white box Testing, Classification, Structural: Coverage, Path testing	8
III	Levels of Testing: Unit Testing: Overview, Integration Testing: Overview, Techniques: Graph based & Path based, Functional Testing, System Testing: Overview, Categories: Reliability Security Performance Recovery, Acceptance Testing: Overview, Types of Acceptance Testing	7
IV	Test Planning: Preparing a Test plan, Scope management, Decide Test Approach, Setting Up Criteria, for testing, Identifying responsibilities, Staffing, training needs, Resource requirements, Test deliverables, Testing Tasks	7

Suggested Evaluation Methods

Internal Assessment:

➢ **Theory**

- Class Participation: 4
- Seminar/presentation/assignment/quiz/class test etc.: 4
- Mid-Term Exam: 7

End Term Examination: A three hour exam for theory.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Software Testing: Principles and Practice by Srinivasan Desikan, Gopalaswamy Ramesh, Pearson Publication
- Software Testing: Principles and Practice by Naresh Chauhan, Oxford
- Software Testing: Easy Learning Approach by Shubha Agarwal Kundlas

<table>
<tr><td colspan="4">Session: 2024-25</td></tr>
<tr><td colspan="4">Part A-Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">COMPUTER SCIENCE</td></tr>
<tr><td>Semester</td><td colspan="3">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Analytics with Python Lab</td></tr>
<tr><td>Course Code</td><td colspan="3">24UN-ICT-VAC402</td></tr>
<tr><td>Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">VAC</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3"></td></tr>
<tr><td>Pre-requisite for the course(if any)</td><td colspan="3">Students must know basics of Python</td></tr>
<tr><td>Course Learning Outcomes (CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. Learn basic statistics needed for data analytics
2. Use data analysis tools in the pandas library.
3. Load, clean, transform, merge and reshape data.
4. Create informative visualization and summarize datasets.
5. Solve real world data analysis problems.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>-</td><td>2</td><td>2</td></tr>
<tr><td>Contact Hours</td><td>-</td><td>4</td><td>4</td></tr>
<tr><td colspan="2">Max. Marks: 50 (P)
Internal Assessment Marks: 15 (P)
End Term Exam Marks: 35 (P)</td><td colspan="2">Time: 3 Hrs. (P)</td></tr>
<tr><td colspan="4">Part B-Contents of the Course</td></tr>
<tr><td colspan="4"><u>Instructions for Examiner</u>

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.</td></tr>
</table>

Topics	Contact Hours
Introduction to basic statistics and analysis: Fundamentals of Data Analysis, Statistical foundations for Data Analysis, Types of data, Descriptive Statistics, Python Libraries: NumPy, Pandas, Matplotlib, Correlation and covariance, Linear Regression, Statistical Hypothesis Generation and Testing Array manipulation using NumPy: NumPy array: Creating NumPy arrays, various data types of NumPy arrays, Indexing and slicing, swapping axes, transposing arrays, data processing using Numpy arrays Data Manipulation using Pandas: Data Structures in Pandas: Series, Data Frame, Index objects, loading data into Panda's data frame, working with Data Frames: Arithmetic, Statistics, Binning, Indexing, Reindexing, Filtering, Handling missing data, Hierarchical indexing, Data wrangling: Data cleaning, transforming, merging and reshaping Plotting and Visualization: Using Matplotlib to plot data: figures, subplots, markings, color and line styles, labels and legends, Plotting functions in Pandas: Lines, bar, Scatter plots, histograms, stacked bars, Heat map	60
Practical List: Use data set of your choice from Open Data Portal(https://data.gov.in/) for the following exercises, wherever data sets are not mentioned explicitly. 1. Make visual representations of data using libraray Matplotlib and apply basic principles of data graphics to create rich analytic graphs for available datasets. 2. Use boston house-prices dataset available with sklearn library to do the following for: i. Generate box whisker plots for price and age of the owner ii. Identify outliers, if any iii. Display5-point summary of data distribution for all attributes iv. Find if there is any missing value in data or not v. Find pairwise correlation between attributes vi. Use scatterplot to show relationship between each feature w.r.t target class in a single panel for comparison 3. Create a CSV file having employee data records. Each employee record has three features viz. age, home city and salary. Import employee file and: i. Draw scatter plot for age vs salary ii. Plot histogram for features age and salary iii. Plot Pie chart for the qualitative attribute city iv. Generate box plots for salary and age 4. Import iris data using sklearn library to: i. Compute mean, mode, median, standard deviation, confidence interval and standard error for each feature ii. Compute correlation between length and width of sepal feature	

	iii. Findcovariancebetweenlengthofsepalandpetal iv. Buildcontingencytableforclass feature 5. Downloaddatasets Hepatitis andautomobilefrom UCIrepository i. Findthenumberof recordswhich arenoise free ii. Cleandataafterremovingnoise iii. Normalizequantitativefeaturesin rangeof[0,1] iv. Comparefrequencydistributionforanytwocolumnsbyplottinghistogramsfor anytwo columns in the same plot 6. Do the following using iris CSV file (use ofPandas/NumPy/SciPy) i. Find total number of records and columns in a csv file ii. Find correlation and contingency table for any two variables iii. Find the coulmn with maximum variance iv. Drawscatterplotforanytwocolumnsandalsowritetheircorrelationin the caption of scatter plot 7. Use car dataset from UCI repository(https://archive.ics.uci.edu/ml/machine-learning-databases/car/) i. Find the most popular car and draw appropriate plot to justify your answer ii. Plot bar chart to compare capacity of any two cars along with their cost iii. Draw word cloud for car names and export to a file	

Suggested Evaluation Methods

Internal Assessment: ➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Mckinney, W. (2017). Python for Data Analysis. Second edition, O'reilly (SPD).
- Grus, J. (2016). Data Science from scratch. First edition, O'reilly(SPD).
- Vander Plas, J. (2016). Python Data Science Handbook: Essential Tools for Working with Data. Second edition, O'reilly(SPD).
- Mode: use mode function of pandas(https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.mode.html)
- Contingency table using crosstab function : use crosstab functionhttps://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.crosstab.html
- Links for Examples on Word clouds:https://www.datacamp.com/community/tutorials/wordcloud-pythonhttps://www.tutorialspoint.com/create-word-cloud-using-pythonhttps://www.geeksforgeeks.org/generating-word-cloud-python/
- LinksforExamplesonContigencytable:https://www.geeksforgeeks.org/contingency-table-in-python/https://www.tutorialspoint.com/contingency-table-in-python