

**CH. BANSI LAL UNIVERSITY,
BHIWANI, HARYANA**



Scheme of Examination for Under-Graduate Programmes

Vocational Courses (VOC)

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
Vocational Courses (Computer Science)
According to Curriculum Framework for Undergraduate Programmes
as per NEP2020 (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
III	CC-M3 (V)	24UN-ICT-VOC-301	Graphic Designing	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
IV	CC-M4 (V)	24UN-ICT-VOC-401	Animation	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
		24UN-ICT-VOC-402	Web Designing	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
V	CC-M5 (V)	24UN-ICT-VOC-501	3-D Graphics	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
		24UN-ICT-VOC-502	Software Testing	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
VI	CC-M6 (V)	24UN-ICT-VOC-601	Mobile App Designing	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
		24UN-ICT-VOC-602	Analytics with Python	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
		24UN-ICT-VOC-603	Data Analytics with R	3	3	20	50	70	3
			Practical	1	2	10	20	30	3



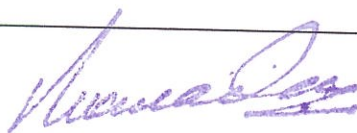
Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Graphic Designing		
Course Code	24UN-ICT-VOC-301		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
Level of the course(As per Annexure-I			
Pre-requisite for the course(if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Perform basic to intermediate image correction to existing images 2. Enhance images using advance editing tools to create magazine covers 3. Work with the Type tools and panels to type, insert and manage text 4. Work with layers and masks to manage your projects efficiently 5. Design various types of documents/cards/logos/etc.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max.Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3Hrs.(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	Elements of design- Types of Lines, Line Compositions, Different types of Shapes-Geometric, Organic, Free-form, Natural, and Shape, composition, Positive & Negative. Textures- Physical & Visual, Texture Composition, Form Space-Positive & Negative	10
II	Introduction to Photoshop: The Photoshop Interface, setting up a new Photoshop document, Saving a new document, The Default Palettes, Working with Photoshop Palettes, The Photoshop Toolbox and Options bar, Using Guides and Ruler, Supported import in export image formats, Opening an Image in Photoshop, Creating Images in Photoshop, Saving Images in Photoshop, Basic Image Editing, Changing Image Size, Cropping an Image, Changing Color/Bit Depth, Optimizing Images using Save for Web, Working with Color in Photoshop.	10
III	Photoshop Tools Move tool, Crop tool, Slice tools, Pencil, Paintbrush, Eraser tools, History brushes, Clone stamp-Pattern stamp, healing brush tool, Retouch tool, Gradient, Paint bucket, Burn-Dodge Sponge, Blur-Sharpen-Smudge, Shapes-Line rectangle- polygon-custom shapes, Path, selection tool, Pen tool, Type tools, Notes Tool-Audio annotation, Eyedropper-Color sampler Measure tool, Hand-Zoom, Quick Mask-Screen modes, Jump to Image Ready, Back ground and Foreground.	10
IV	Photoshop Layers About Layers-Fill and adjustment. layers, The Layer Palette, Naming Layers, Creating Layers, Deleting Layers, Viewing Layers, Moving Layers, Layer Opacity, Locking Layers, Merging Layers, Layer modes and blending options, Image composting using layers.	10
V*	Apply Photoshop skills to demonstrate following: • Use basic selection tools and edge refinement to isolate and edit parts of an image. • Manipulate layers through ordering, positioning, scaling, rotation, and adjustments. • Create composite images that demonstrate advanced selection and layering techniques. • Prepare images for Web and print output with appropriate sizing and resolution. • Apply painted masks, selection-based masks, gradient masks, and blend modes to create sophisticated image effects.	25

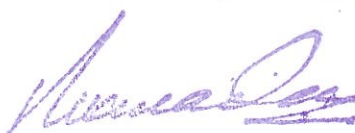


	• Create adjustment layers for editable, non-destructive changes to image coloration and exposure. • Set and modify typography using the full range of type tools, the Character panel, and the Paragraph panel. • Apply special effects to typography using masks, paths, and layer styles. • Use preset brushes and custom brushes to colorize images, enhance images, and build illustrations.	
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • 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: • Adobe Photoshop Bible, Dayley and Dayley, Wiley India Publication. • Photoshop in Easy Steps 1st Edition (Paperback), Robert Shuttleworth, Tata McGraw-Hill Publication. • Adobe Photoshop - Classroom in a Book 1st Edition, Adobe Creative Team, Pearson Publication		

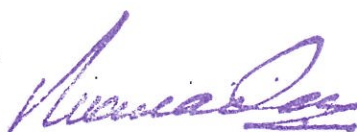
*Applicable for courses having practical component.



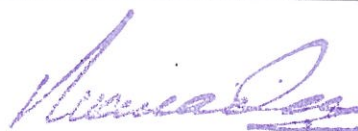
Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	IV		
Name of the Course	Animation		
Course Code	24UN-ICT-VOC-401		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
Level of the course(Asper Annexure-I)			
Pre-requisite for the course(if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand the basic idea of 2-D animation. 2. Using Photoshop for animation. 3. Using Corel-Draw and paint for animation 4. Using Macromedia Flash for animation 5*.Implementing the animation using Photoshop, Corel-Draw, Paint and Flash.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time:3Hrs.(T),3Hrs.(P)	
Part B- Contents of the Course			
Instructions for Paper-Setter			
Unit	Topics	Contact Hours	
I	Introduction to 2D Animation: Basic of sketching, still life and assignment of basic drawing, Composition of basic elements, Creating Digital Layout, Working with visual images, Paint & animate (scanning, tracing, ink & Paint)	10	
II	Drawing concept, Work in different media, such as drawing, collage, and painting, Professional image editing (PHOTOSHOP),Story Boarding, Understanding Background	10	



	composition	
III	Colour theory & basics, Explore the relationship between elements and principal, Advertising and relevant case, Graphics and illustration (Corel Draw, Paint), Titles and Credit Making, Basic Understanding of 2D animation and technique.	10
IV	Incorporating sound into 2D animation, Pixel and resolution: Vector and Bitmap Graphics, Vector Composition , 2D animation (Macromedia Flash), Stop motion animation, Animation with flash, Portfolio Making	10
V*	• Drawing fundamentals using lines • Sketching of cartoon characters • 2D Logodesigning • Story boarding of a 30 seconds film • Portfolio making of an organization	25
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab record etc.: 5 • 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: • The Illusion of Life: Disney Animation, Ollie Johnston and Frank Thomas, Disney Editions. • Blender Production Creating Short Animations from Start to Finish, Roland Hess, Routledge. • Animating with Blender: Creating Short Animations from Start to Finish, Roland Hess, Focal Press • Simplified Drawing for Planning Animation, Wayne Gilbert, Anamie Entertainment Ltd. • Creating Characters with Personality: For Film, TV, Animation, Video Games, and Graphic Novels, Tom Bancroft, Watson-Guptill • Force: Dynamic Life Drawing for Animators, Mike Mattesi, Focal Press		



Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	IV		
Name of the Course	Web Designing		
Course Code	24UN-ICT-VOC-402		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
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*.to understand the designing of a static websites.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max.Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time:3Hrs.(T), 3Hrs.(P)	
Part B-Contents of the Course			
<u>Instructions for Paper-Setter</u> 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	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.	10
II	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.	10
III	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.	10
IV	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.	10
V*	Practicum Web Designing: - 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 textcolourwithtitle“MyFirstWebPage”usingallthe attributes of the Font tag. - WriteHTMLcodetodesignapagecontainingsome text in a paragraph by giving suitable heading style. - WriteHTMLcodetodisplaythreeimagesatLEFT, RIGHT and CENTER respectivelyin web browser. - WriteHTMLcodewhich containsHyperlinks. - ProgrambasedonHTMLformandframes - DesignaHTMLtable with theuseofcolspanandrow	25

	span. CSS: • PracticalbasedonCSS	
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation:5 • Seminar/presentation/assignment/quiz/classtestetc.:5 • Mid-Term Exam:10 ➤ Practicum • Class Participation:5 • Seminar/Demonstration/Viva-voce/Labrecordsetc.:5 • 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: • Deitel H.M., Deitel P.J., Internet & Worldwide Web: How to program, Pearson Education. • Jackson, Web Technologies, Pearson Education		

*Applicable for courses having practical component.



Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	V		
Name of the Course	3-D Graphics		
Course Code	24UN-ICT-VOC-501		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
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 computer graphics 2. understand the 3-D transformation of images 3. understand the Concepts of viewing in 3-D 4. determine the visible surface in an image 5*.to implement the various graphics elements.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max.Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time:3Hrs.(T),3Hrs.(P)	
Part B-Contents of the Course			
<u>Instructions for Paper-Setter</u>			
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 Graphics: Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.	10
II	Three-Dimensional Transformations: Three-Dimensional Scaling, Three-Dimensional Shearing, Three- Dimensional Rotation, Three-Dimensional Reflection, Three- Dimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating Perspective Views, Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections.	10
III	Viewing in 3D: Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Examples of 3D Viewing, The Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid.	10
IV	Visible-Surface Determination: Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing, comparison of the methods.	10
V*	Practicum Study and enlist the basic functions used for graphics in C /C++/ Python language. Give an example for each of them. • Draw a co-ordinate axis at the center of the screen. • Divide your screen into four regions, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message. • Draw a simple hut on the screen. • Draw the following basic shapes in the center of the screen i Circle ii. Rectangle iii. Square iv. Concentric Circles v. Ellipse vi. Line • Program to create a house like figure and perform the following operations. i. Scaling about the origin followed by translation. ii. Scaling with reference to an arbitrary point. iii. Reflect about the line $y=mx+c$. • Develop a simple text screen saver using graphics functions.	25

	• Performsmilingfaceanimationusinggraphic functions.	
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation:5 • Seminar/presentation/assignment/quiz/class test etc.:5 • Mid-Term Exam:10 ➤ Practicum • Class Participation:5 • Seminar/Demonstration/Viva-voce/Lab records etc.:5 • 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: • Computer Graphics-Principles and Practice, J.D. Foley, A.VanDam, S.K.Feiner and J.F.Hughes, Pearson • Fundamentals of Computer Graphics, Steve Marschner,PeterShirley, CRC press • Computer Graphics, Hearn, Baker, Pearson • Principles of Interactive Computer Graphics, WilliamM.NewmanandRobert F. Sproull, TMH • Mathematical Elements for CG,D.F.Rogers,J.A.Adams, TMH		

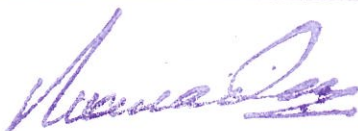
*Applicable for courses having practical component.



Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	V		
Name of the Course	Software Testing		
Course Code	24UN-ICT-VOC-502		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
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. To 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
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time:3Hrs.(T),3Hrs.(P)	
Part B- Contents of the Course			
<u>Instructions for Paper-Setter</u>			
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: 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 Life cycle	10
II	Types of Testing: BlackBox 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	10
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	10
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	10
V*	Practicum: 1. Prepare a small project and submit SRS, design, coding and test plan. 2. Study of any one of the testing tools. (e.g. WinRunner, TestDirector, etc) 3. MANUAL TESTING for the project a. Whitebox Testing b. Blackbox Testing 4. Functional Testing a. Boundary value Testing b. Equivalence class testing 5. Structural Testing a. Path testing b. Data-flow testing	25
Suggested Evaluation Methods		
Internal Assessment: > Theory - Class Participation: 5 - Seminar/presentation/assignment/quiz/class test etc.: 5 - Mid-Term Exam: 10 > Practicum - Class Participation: 5 - Seminar/Demonstration/Viva-voce/Lab record etc.: 5 - 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: 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

*Applicable for courses having practical component.



Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	VI		
Name of the Course	Mobile App Designing		
Course Code	24UN-ICT-VOC-601		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
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. know the components and structure of mobile application development frameworks for Android based mobiles; 2. design and implement the user interfaces of mobile applications. 3. Understand the concept of Intents 4. Implement fragments in Android application; 5*.understand the designing of a mobile application.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max.Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time:3Hrs.(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: Mobile Applications, Characteristics and Benefits, Application Models, Mobile devices Profiles. Basics of Android, Importance and scope, Android Versions, Features of Android, Android Architecture, Android Stack, Android Applications Structure, Android Emulator, Android SDK, Overview of Android Studio, Android And File Structure, Android Virtual Device Manager, DDMS, LogCat.	10
II	Android User Interface: Measurements – Device and pixel density independent measuring units. Layouts – Linear, Relative, Grid and Table Layouts. User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers, List View, Spinner View.	10
III	Event Handling – Handling clicks or changes of various UI components. Intents and Broadcasts: Intent–Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents Services- Callbacks and Override in application, Application Signing, API keys for Google Maps, Publishing application to the Android Market.	10
IV	Fragments – Creating fragments, Lifecycle of fragments, Fragment states, adding fragments to Activity, adding, removing and replacing fragments with fragment transactions; Introduction to SQLite database	10
V*	Practical List: 1. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the emulator. Also display “Hello World” in the middle of the screen in the Android Phone. 2. Create an application with three buttons (increment, decrement and reset) and a text View aligned vertically. On clicking, increment/decrement button, the value of the textview should increment/decrement by 1 while selecting reset button, the value of textview should become zero. 3. Create an application with login module. (Check username and password). 4. Create an application to display various activity life cycle methods. 5. Create an application using explicit Intents. 6. Create an application using implicit Intents. 7. Create an application to display various fragment life cycle	25

	methods.	
	8.Create an application with 2 fragments, one to set the background and other to set the fore-color of the text.	
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation:5 • Seminar/presentation/assignment/quiz/class test etc.:5 • Mid-Term Exam:10 ➤ Practicum • Class Participation:5 • Seminar/Demonstration/Viva-voce/Lab records etc.:5 • 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: • Zigurd Mednieks,LairdDornin,G,BlakeMeikeandMasumiNakamura,Programming Android, O'Reilly Publications. • Wei-MengLee,BeginningAndroidApplicationDevelopment,WileyIndia Ltd. • JamesC.S.,AndroidApplicationdevelopmentforJavaProgrammer,CENGAGE Learning. • PradeepKothari,AndroidApplicationDevelopment:BlackBook,WileyIndia Ltd. • GargentaM.,NakamuraM., LearningAndroid,O'ReillyPublications.		



Part A-Introduction			
Subject	COMPUTER SCIENCE		
Semester	VI		
Name of the Course	Analytics with Python		
Course Code	24UN-ICT-VOC-602		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
Level of the course (Asper Annexure-I)			
Pre-requisite for the course(if any)	Students must know basics of Python		
Course Learning Outcomes (CLO):	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 data sets. 5*. Solve real world data analysis problems.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max.Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))	Time:3Hrs.(T),3Hrs.(P)		
Part B-Contents of the Course			
<u>Instructions for Paper-Setter</u>			
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 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	10
II	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	10
III	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	10
IV	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, Heatmap	10
V*	Practical List: Use data set of your choice from Open Data Portal (https://data.gov.in/) for the following exercises, wherever datasets are not mentioned explicitly. 1. Make visual representations of data using library 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. Display 5-point summary of data distribution for all attributes iv. Find if there is any missing value in data or not v. Find pair wise 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	25



iii. Find covariance between length of sepal and petal iv. Build contingency table for class feature 5. Download datasets Hepatitis and automobile from UCI repository i. Find the number of records which are noise free ii. Clean data after removing noise iii. Normalize quantitative features in range of [0,1] iv. Compare frequency distribution for any two columns by plotting histograms for any two columns in the same plot 6. Do the following using iris CSV file (use of Pandas/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 column with maximum variance iv. Draw scatter plot for any two columns and also write their correlation in 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: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab record etc.: 5 • 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: • McKinney, W. (2017). Python for Data Analysis. Second edition, O'Reilly (SPD). • Grus, J. (2016). Data Science from scratch. First edition, O'Reilly (SPD). • VanderPlas, 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 function https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.crosstab.html • Links for Examples on Word clouds: https://www.datacamp.com/community/tutorials/wordcloud-python https://www.tutorialspoint.com/create-word-cloud-using-python https://www.geeksforgeeks.org/generating-word-cloud-python/ • Links for Examples on Contingency table:	



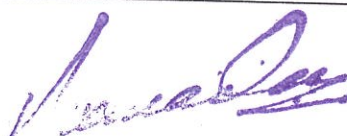
<https://www.geeksforgeeks.org/contingency-table-in-python>
<https://www.tutorialspoint.com/contingency-table-in-python>

Manab

Part A-Introduction			
Subject	COMPUTERSCIENCE		
Semester	VI		
Name of the Course	Data Analytics with R		
Course Code	24UN-ICT-VOC-603		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
Level of the course(As per Annexure-I)			
Pre-requisite for the course(if any)	Students must know basics of R		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Develop an Rscript for data analysis and execute it. 2. install, load and deploy the required packages. 3. Analyse the data stored in files in different formats. 4. Identify suitable data visualization and exploration methods to answer a business question. 5*.interpret the results of analysis.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time:3Hrs.(T),3Hrs.(P)	
Part B-Contents of the Course			
<u>Instructions for Paper-Setter</u>			
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 Programming Structures: R interpreter, Introduction to major R data structures like vectors, matrices, arrays, list and data frames, Flow control and loops, looping over list and array, user-defined functions	10
II	File Handling: Installing, loading and using packages for reading data from file Data Preprocessing and Transformation: Handling of missing data, Data cleaning and transformation	10
III	Data Exploration: Exploring data using statistical methods: mean, median, mode, quantiles. Building contingency table, correlation, co-variance.	10
IV	Plotting Data: Data visualization using Scatter plot, Line graph, Histogram, Boxplot, and other plots in R used for data visualization	10
V*	Practical List: - Find measures of central tendencies for the given data. - Draw the boxplot for the given data and analyze skewness. - Randomly generate 30 numbers in the range of 1 to 40 and do the following a) Generate box plot b) Identify outliers, if any c) Display 5-point summary of data distribution Use data set of your choice from Open Data Portal (https://data.gov.in/) for the following exercises. - Read the all rows from the CSV file, with header. Write an R script to: a) create a subset of the data records that satisfy a condition. b) find suitable descriptive statistics for each column. c) draw boxplot for the numeric attributes and identify outliers, if any d) find correlation for each pair of numeric attributes, and draw scatter plot matrix. e) draw histograms, pie charts for categorical attributes. f) draw the probability density curve for numeric attributes. - Read the CSV file, without headers and a. Find the number of records which are noise free. Clean data after removing noise c. Normalize quantative features in range of [0,1] - Practical based on vectors, arrays and lists, data frames - Practical based on reading/writing data from/to files. - Practical based on data cleaning and transformation - Practical based on linear regression - Practical based on visualizing data as Scatter Plot, line graph, histogram, boxplot, line plots regression, word clouds, and exporting plots as images	25
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory - Class Participation:5 - Seminar/presentation/assignment/quiz/classstestetc.:5		End Term Examination: A three hour exam for both theory and



• Mid-Term Exam:10	practicum.
➤ Practicum • Class Participation:5 • Seminar/Demonstration/Viva-voce/Labrecordsetc.:5 • Mid-Term Exam: NA	
PartC-LearningResources	
Recommended Books/e-resources/LMS: • Cotton, R. (2017). Learning R, A step by step function guide to data analysis. O'reilly (SPD). • Gardener, M. (2017). Beginning R, The statistical programming language. WILEY. • Teetor, P. (2017). R Cookbook (10thEdition reprint). O'reilly (SPD). • Web Resources https://irnold.github.io/r4ds-exercise-solutions/index.htmlhttps://www.r-project.org/ https://cran.r-project.org/	

