Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Department of Computer Science
Program Skeleton for
B. Voc. (Computer Technology)
Third Year (Semester V + Semester VI)
Job Role: Application Developer (NSQF Level 7)
Software Developer (NSQF Level 7)
Syllabus (2023-24)

	Course Code	Course Title	Credits	Hrs / Week	Marks ESE	Marks CE	Total Marks
Semester V	CT.GE.501	Logical Reasoning and Personality Development (General Education)	4	4	60	40	100
	CT.GE.502	Computer Ethics (General Education)	4	4	60	40	100
	CT.GE.503	Free and Open-Source Software (FOSS) (General Education)	4	4	60	40	100
		Total Credit (A)	**12**		**Total Marks (A)**		**300**
	CT.SC.501	Web Development using Angular (Skill Component)	4	4	60	40	100
	CT.SC.502	Kotlin Programming (Skill Component)	4	4	60	40	100
	CT.SC.503	Mobile Application Development (Skill Component)	4	4	60	40	100
	CT.SC.PR1	LAB Course12 Angular (Skill Component)	2	4	30	20	50
	CT.SC.PR2	LAB Course13 Kotlin (Skill Component)	2	4	30	20	50
	CT.SC.PR3	Mini Project (Skill Component)	2	4	30	20	50
		Total Credit (B)	**18**		**Total Marks (B)**		**450**
		Total Credit (Sem – V) (A + B)	**30**		**Total Marks(A+B)**		**750**

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Department of Computer Science
Program Skeleton for
B. Voc. (Computer Technology)
Third Year (Semester V + Semester VI)

	Course Code	Course Title	Credits	Hrs / Week	Marks ESE	Marks CE	Total Marks
Semester-VI	CT.GE.601	Cyber Security (General Education)	4	4	60	40	100
	CT.GE.602	Data Visualization Tools (General Education)	4	4	60	40	100
	CT.GE.603	Introduction to Digital Marketing (General Education)	4	4	60	40	100
		Total Credit (A)	**12**		**Total Marks (A)**		**300**
	CT.SC.601	Android Application Development using Kotlin (Skill Component)	4	4	60	40	100
	CT.SC.602	Software Development using C#.net	4	4	60	40	100
	CT.SC.603	Test Engineering (Skill Component)	4	4	60	40	100
	CT.SC.PR1	LAB Course 14 App and Software Development (Skill Component)	2	4	30	20	50
	CT.SC.PR2	Project (using any one of the courses above) (Skill Component)	4	4	60	40	100
		Total Credit (B)	**18**		**Total Marks (B)**		**450**
		Total Credit (Sem-VI) (A + B)	**30**		**Total**		**750**
		Total Credit (SemV + SemVI)	**60**	Total Marks (Sem V + SemVI)			**1500**

ESE- End Semester Examination CE-Continuous Evaluation

Split-up of Continuous evaluation marks

Total Marks: 40

Unit Test 1	Unit Test II	Total Marks	Converted Marks	Marks for Attendance	Total Marks
30	30	60	**30**	**10**	**40**

B. Voc. Computer Technology
Semester: V
General Education-XIII

Logical Reasoning and Personality Development CT.GE.501

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- To enhance the problem-solving skills.
- To improve the basic mathematical skills.
- To help students who are preparing for any type of competitive examinations.
- The Personal Development domain recognizes the importance of developing an integrated sense of personal identity, a positive sense of self, and a personal code of ethics.

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Solve aptitude papers covering Quantitative Ability, Logical Reasoning.
4. Compete in various competitive exams.
5. Students who participate in Student Affairs programs, activities and services will develop an integrated sense of personal identity, a positive sense of self, and a personal code of ethics.

Unit I Quantitative Aptitude I	**NOS**	**Hours**
Area, Average, Discount, Boats and Streams, Surds and Indices, Ratio and Proportion, Partnership, Volume and Surface Area. Compound Interest, Problem on Ages, Percentage, Seating arrangement, Blood Relations, Syllogisms and Venn Diagrams. HCF and LCM Simple Interest, Problems on Trains, Profit and Loss, Square Root and Cube Root, Time and Distance, Time and Work.		15
Unit II Quantitative Aptitude II and Logical Reasoning	**NOS**	**Hours**
Permutation & Combination, Geometry & Mensuration, Selection and Conditionals, Mapping and best routes. **A**ssumption and Binary Logic, Clock and Calendars, Puzzles, Data Sufficiency, Graph Related, Tables and Caselets, Trigonometry, Logarithms, and Sets.		15

Unit III PERSONALITY DEVELOPMENT	**NOS**	**Hours**
Leadership, Self-Preparation and Communication Leadership: Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in Administration. • Preparation of Self –Introduction • Body language • SWOT Analysis • Increasing vocabulary Introduction to Communication, Flow of Communication, Listening, Barriers of Communication, how to overcome barriers of communication.		15

Communication Skills and Listening Skills 1) Group Discussion 2) Debate 3)Extempore 4)Seminar 5) Effective presentations. Interview Skills		
Unit IV Stress and Time Management and Motivation	**NOS**	**Hours**
Stress: Introduction to Stress, Causes of Stress, Impact Management Stress, Managing Stress, Building self-esteem and self-confidence. **Time**: Time as a Resource, Identify Important Time Management Wasters, Individual Time Management Styles, Techniques for better Time Management. **Motivation**: Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation		15
	Total	60

Reference Books:

1. Quantitative abilities **Author:** by Arun Sharma
2. Quantitative Aptitude for Competitive Examinations **Author:** by R S Agrawal.

B. Voc. Computer Technology
Semester: V
General Education-XIV

Computer Ethics CT.GE.502

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course prepares students to distinguish between the various ethical theories which can be used to form the basis of solutions to moral dilemmas in computing.
- Identify traditional and current Issues related to Computers, Information Systems, Ethics, Society and Human Values;

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Describe and distinguish between the various ethical theories which can be used to form the basis of solutions to moral dilemmas in computing.
2. Identify and define the components of a structured plan for solving ethical problems and, in the process, will be able to understand the basis for her/his own ethical system.
3. Develop skills of critical analysis and applying ethical principles to situations and dialectical thinking.

Unit I The Need for Computer Ethics Training	**NOS**	**Hours**
Definition of Ethics, The Importance of Integrity, The Difference between Morals, Ethics, and Laws, Defining the Field of Computer Ethics, Computer ethics codes		15
Unit II Sample topics in Computer Ethics	**NOS**	**Hours**
Computer crime and computer security, Software theft and intellectual property rights, Computer hacking and the creation of viruses, Computer and information system failure, Invasion of privacy. Privacy in the Workplace and on the Internet, Social implications of artificial intelligence and expert systems.		15
Unit III Components, Binding and Directives	**NOS**	**Hours**
IT Professionals, Are IT Workers Professionals, Professional Relationships that Must Be Managed, Professional Codes of Ethics, Professional Organizations, Certification Copyright, Government Licensing, IT Professional Malpractice IT Users, Common Ethical Issues for IT Users, Supporting the Ethical Practices of IT Users, Compliance		15
Unit IV Social Networking	**NOS**	**Hours**
What Is a Social Networking Web Site? Business Applications of Online Social Networking, Social Network Advertising, The Use of Social Networks in the Hiring Process, The Use of Social Media to Improve Customer Service , Social Shopping Web Sites, Social Networking Ethical Issues, Cyber bullying, Cyber stalking, Uploading of Inappropriate Material, Online Virtual Worlds, Crime in Virtual Worlds		15
	Total	60

Reference Books:

1. Computing Ethics & Social Values, Deborah J Nissenbaun
2. Readings in Cyber ethics by Spinello, R, Tavani,
3. Computer Ethics and Professional Responsibility by Bynum, T, W and Rogersons
4. Ethics in information Technology by George w Renolds

B. Voc. Computer Technology
Semester: V
General Education-XV

Free and Open-Source Software CT.GE.503

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- Students will understand FOSS benefits and licenses.
- Students will understand Linux commands.
- Students will understand working of OBS software.
- Students will understand Google drive, docs, sites, slides.

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Understand the FOSS software.
2. Learn Linux operating system working.
3. Work with Google drive, Google Docs, Google sites, Google slides, etc.

Unit I Introduction to FOSS	**NOS**	**Hours**
Notion of Community–Guidelines for effectively working with FOSS community–, Benefits of Community based Software Development – Requirements for being open, free software, open-source software – Four degrees of freedom – FOSS Licensing Models – FOSS Licenses – GPL- AGPL- LGPL – FDL – Implications – FOSS examples. **FOSS Operating System:** Introduction to O.S, examples of FOSS operating system.		15
Unit II Open-Source Operating System	**NOS**	**Hours**
Linux Basic History of Linux, Comparison of Linux with Windows, Linux as Layered structure. Linux commands ls, rm, cp, cd, mkdir, mv, more, head, tail, pwd, chmod, tar, gzip, echo, date, cal, bc, cut, paste, sort command. grep with all options, man, info, ps, kill, fg, bg, redirection and pipe command. Linux Tree Structure, creating user and assigning password, creating user defined command. Linux shell scripts vi Editor Basic Concepts, Shell Programming, Types of Shell, Environment Variables, Programming Construct: loops, conditions, logical operators, case constructs, if statement.		15
Unit III Open-Source Tools- I	**NOS**	**Hours**
Google Drive: Introduction, create an account, upload, download, delete and restore files in Google drive **Google Docs:** Introduction, Creating Your First Document, Naming the Document, Entering Text, Saving the Document, Introducing Formatting, Using the Formatting Toolbar, Printing a Document, Inserting Page Breaks, Checking Your Spelling, Choosing Your Print Settings, Exporting and Printing the Document, Deleting a Document, Formatting Documents, Formatting a Document, Using a Dictionary, Thesaurus, or Encyclopedia, Taking Your Docs to the Next Level: Lists, Tables, and Insertions, Working with Lists, Creating a List, Editing a List, Adding Tables to a Document, Creating a Table, Editing a Table, Inserting and Editing Images, Creating a Table of Contents, Editing a		15

Table of Contents, Sharing a Document, Choose Sharers and Set Permissions **Google Sheets:** Introduction, Creating Google Sheets, Format Cells, Rows, Columns and Entire Worksheet, Editing, Printing, Working with Formulas and Functions, Creating Charts. **Google Forms:** Introduction, Create A Google Form, adding a Question, Adding Text, Adding an Image, Copying and Deleting Questions, Require a Response, Rearranging Questions and Images Question Types: Introduction, Short Answer, Paragraph, Multiple Choice, Checkboxes, Dropdown, File Upload, Linear Scale, Multiple Choice Grid, Checkbox Grid, Date and Time. Form and Question Setting, Response Validation Changing Color and Backgrounds, Viewing Responses.		
Unit IV Open-Source Tools- II	**NOS**	**Hours**
Google Scholar: Introduction, create a Profile, Adding the Paper in Library, Searching the Papers. **Google sites:** Introduction, Google Sites Setup, Create Your Site, Customize the Site and Update the Look of Site, Create More Pages, Add Content to Your Pages, Review the Content Tips and Resources Review and Share. **Google Slides:** Introduction, Navigating Google Slides, Working with Templates and Existing Presentations, The Basics of Creating Presentation, Applying Themes, Background, and Layouts to Slides, Entering, Editing and Formatting Text, Inserting Images on Slides, Adding Transitions, Animations and Videos. **Introduction to OBS:** Introduction, OBS Interface, OBS Settings, Creating a Video.		15
	Total	60

Reference Books:

1. Complete Reference Linux by Sixth Edition (English, Paperback, Petersen Richard)
2. Red Hat Linux
3. Linux and Unix – Sumitbha Das—TMH

Online References:

1. https://www.revereschools.org/cms/lib/OH01001097/Centricity/Domain/10/Google%20Sheets%20Ultimate.pdf
2. http://images.pcmac.org/Uploads/marshallcountysd/marshallcountysd/Divisions/DocumentsCategories/Documents/Beginner%27s%20Guide%20to%20Google%20Form_%7BSISdcf210b2670d%7D.pdf
3. https://novel.utah.edu/files/nanos/2010/Google_Scholar-Books.pdf
4. https://www.uis.edu/informationtechnologyservices/wp-content/uploads/sites/106/2013/04/GoogleSitesHandout-2011.pdf

B. Voc. Computer Technology
Semester: V
Skill Component-XIII

Web Programming using Angular CT.SE.501

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course helps students to learn latest version of Angular as per industry requirement for web and app development.

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Understand the basic knowledge of Typescript and its use in Angular.
2. Use Angular for application development as per Industry requirement.
3. Develop the interactive and responsive web pages using Angular Framework.

Unit I Introduction to TypeScript	**NOS**	**Hours**
Introduction, Overview, Environment Setup, Basic Syntax, Variables, Operators, Decision Making, Loops, Functions, Numbers, String, Arrays, Union, Interfaces, Classes, Objects.		15
Unit II Introduction to Angular	**NOS**	**Hours**
What is Browser? Introduction to Angular, History of Angular, Development Environment, Angular Life Cycle, Project Setup, Project Structure, Installation, Bootstrap in Angular.		15
Unit III Components, Binding and Directives	**NOS**	**Hours**
Components, Module, Scope, Interpolation. **Binding**- Data Binding, Event Binding, Class Binding, Style Binding, Templates. **Directives**- Definition, scope, Directive with child scope, Passing data into a Directive.		15
Unit IV Pipes, Routing and Animation	**NOS**	**Hours**
Pipes, CLI, NgIf, NgSwitch, Ngfor, Services. **Routing-** Routing modes, Advance Routing. **Angular Animation**- Installation, using css3 animation, using css3 transition, built in directives.		15
	Total	60

Reference Books:

1. "ng-book The Complete Book on AngularJS" by Ari Lerner.
2. "Angular: Up and Running" by Shyam Seshadri.

B. Voc. Computer Technology
Semester: V
Skill Component-XIV

Kotlin Programming CT.GE.502

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course helps students to learn concept of Kotlin, also this course teaches students how to develop applications for the Android operating system.

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Understand basics of Kotlin programming.
2. Expansion an understanding of the processes that are involved in an Android Application Development.

Unit I Introduction to Kotlin	**NOS**	**Hours**
Introduction, Overview, Environment Setup, Basic Syntax, Architecture, Variable, Datatypes, Operator, Conditional statements, Loops, Enum. **Array-** Generic Array, Arrays of Primitives, Create an Array, create an array using closure, Create an uninitialized array. **String-** String Equality, String Literals, Elements of string. **Kotlin Application**-Kotlin on server side, Kotin on Android. **Functions**- Definition, Recursive Function, Default and Named Argument, Higer order function, Inline function, Vararg parameter in function, Basic Lambdas. **Ranges-** Integral types Ranges, downTo() function, step() function, until function.		15
Unit II Classes and Objects	**NOS**	**Hours**
Defining Class Hierarchies-Class, Visibility Modifiers, Inner and nested classes, Inheritance. **Declaring a Class with nontrivial constructor or properties:** Primary Constructor and initializer blocks, Secondary constructor, initializing the superclass in different ways, implementing properties declared in interfaces. **Compiler-generated methods:** Universal object methods, Data Classes, Class Delegation. **Declaring an instance-** Object Declaration**:** Singleton Objects, Annotations		15
Unit III Exception Handling and Null Safety	**NOS**	**Hours**
Exception Handling: Introduction, try catch, Multiple catch Block, Nested try-catch block, finally Block, throw keyword **Null Safety:** Nullable Types and Non-Nullable Types, Smart cast, Unsafe and Safe Cast Operator, Elvis Operator		15

Unit IV Kotlin for Android	NOS	Hours
Why use Kotlin on android? Kotlin on Android, setting up kotlin for android, Using Kotlin in Android Studio, Auto-Generated Gradle Configuration, Converting Java Code to Kotlin, APP #1: A TO-DO List app.		15
	Total	60

Reference Books:

1. "Kotlin in Action" Dmitry Jemerov, Svetlana Isakova -Manning Publications (2017)
2. "Kotlin for Android App Development" by Peter Sommerhoff.

B. Voc. –Computer Technology

Semester: V

Skill Component -XV

Mobile Application Development-I CT.GE.503

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course shall build a platform for students to start their own enterprise
- To become familiar with Android development tools and user interface.

Learning Outcomes:

After successful completion of this course, students will be able to:

1. Awareness of existing demanding trends in IT industry in order to get placement & research.
2. Understand the Android OS architecture.
3. Install and use appropriate tools for Android development, including IDE.
4. Develop applications for android OS.

Unit I Introduction	**NOS**	**Hours**
Introduction to Mobile Programming, Overview of the Operating Systems used on different mobile devices, Need of Mobile Application, Introduction to Android, Types of Mobile Applications, Android History, Android Features and Versions, Various IDE for Android, Installing Android Studio.		15
Unit II Android and UI Architecture	**NOS**	**Hours**
Android Architecture, Linux Kernel, Dalvik Virtual Machine, Android Stack, Android applications structure, Creating a project, Working with the AndroidManifest.xml, Using the log system, Activities, Application context, Intents, Activity life cycle, Supporting multiple screen sizes, Android Components, Android Application Structure, Call Back Methods.		15
Unit III Android UI Elements	**NOS**	**Hours**
<TextView>, <EditText>, <Button>, <RadioGroup>, <RadioButton>, <CheckBox>, <ListView>, <WebView>, <Spinner>, <ImageView>, ProgressBar.		15
Unit IV Android Menu, Service & Database	**NOS**	**Hours**
Android Menu, Resource File, Toast, Custom Toast, AlertDialog, PromptDialog, Service Life Cycle, Service Type, Sql Query, SQLite Database Connectivity, Android with Php & Mysql		15
	Total	60

Reference Books:

1. Professional Android 4 Application Development, Edition 3 by Reto Meier, Wrox Publication
2. Beginning Android 4 Application Development, Edition illustrated by Wei-Meng Lee, John Wiley & Sons, Wrox Publication
3. Sams Teach Yourself Android Application Development in 24 Hours, Edition illustrated by Darcey & Shane Conder, Sams Publishing
4. Learning Android by Marko Gargenta, OREILLY
5. Android Black Book

B. Voc. Computer Technology
Semester: V

Skill Laboratory Course- XII

Credit: 02 Periods: 60

(To be implemented from the Academic year 2020-2021)

Experiments based on Skill Component-XII

1. Introduction and Installation of Visual studio code and Typescript.
2. Program for Variables declaration and Operators in Typescript.
3. Program for Decision Making and Loops in Typescript.
4. Program for Functions in Typescript.
5. Program for Numbers, String, Arrays in Typescript.
6. Program for Classes, Objects and Interfaces in Typescript.
7. Introduction and Installation of Angular.
8. Program for "Hello World" in Angular.
9. Program for Bootstrap in Angular.
10. Program for Interpolation in Angular.
11. Program for Data Binding and Event Binding in Angular.
12. Program for Class Binding, Style Binding in Angular.
13. Program for NgIf, NgSwitch, Ngfor in Angular.
14. Program for Routing in Angular.
15. Program for CSS animation in Angular.

B. Voc. Computer Technology

Semester: V

Skill Laboratory Course- XIII

Credit: 02 Periods: 60

(To be implemented from the Academic year 2020-2021)

Experiments based on Skill Component-XIII

1) Installation of Kotlin.
2) Program for variable declaration in Kotlin.
3) Program for declaring String and manipulating string.
4) Program on Operators.
5) Program on Conditional Statement.
6) Program on Loops.
7) Program on Arrays.
8) Program for Simple function and Recursive function.
9) Program on Default and Named argument in function.
10) Program for Inline function and Vararg parameter in function,
11) Program for Classes and Objects.
12) Program on Constructor.
13) Program for interfaces.
14) Program for Exception handling.
15) Program for App development.

B. Voc. Computer Technology

Semester: V

Skill Laboratory Course- XIV

Credit: 02 Periods: 60

(To be implemented from the Academic year 2020-2021)

Experiments based on Skill Component-XIV

1) Installation of Android Studio.
2) Study of Android Application structure.
3) Sample App for Working with AndroidManifest.xml
4) Sample App for Working with Activities.
5) Sample App for Working with Application Context.
6) App for Demonstration of Activity Life Cycle.
7) App for demonstration of TexView and EditText.
8) Sample App for Working with Checkboxes and Buttons.
9) Sample App for Working with RadiGroup and RadioButton.
10) Sample App for Working with ListView and WebView.
11) Sample App for Working with Spinner, ImageView and Progressbar
12) Sample App for Working with Toast.
13) Sample App for Working with AlertDialog and PromptDialog
14) Database Connectivity.
15) Simple app development with database connectivity.

B. Voc. Computer Technology

Semester: V

Skill Laboratory Course- XV

Credit: 02 Periods: 60

(To be implemented from the Academic year 2020-2021)

Prerequisite: HTML5, CSS3, Bootstrap4, JavaScript, jQuery, XML, Java or Any Programming Language and Android Studio.
Database (MYSQL/MongoDB/Oracle/Access etc).
Mini Project should contain minimum 5 pages of your Mobile Application.
User Interface should be in HTML5, CSS3, Bootstrap4, XML or any latest UI framework.
App must contain all UI elements
App may contain JavaScript, jQuery for more attractiveness.
Establish Database connectivity with backend.
Try to publish your app in Playstore.

B. Voc. Computer Technology

Semester: VI

Cyber Security (General Education) CT.GE.601

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- to understand the concept of cyber security along with its need in day-to-day life
- to learn basic concepts of networking, idea of Passwords and important aspect of security policy
- to understand physical security and its need
- to learn different applications used for mobile security
- understand the firewall as a security measure and its types.

Course Outcomes:

- After Completion of this course students will be able to
- Understand the concept of cyber security along with its need in day-to-day life
- Use the basic concepts of networking for security, understand the idea of Passwords and important aspect of security policy
- Understand physical security and its need
- Use different applications for mobile security
- Understand the firewall as a security measure and its types.

UNIT I: Introduction to Cyber Security and Basic Terminology	**NOS**	**Hours**
What is cyber security? Need for cyber security (case studies), statistics, Layered approach to cyber security, Latest Technological Trends, Introduction to IoT, How the Internet of Things (IoT) Is Changing the Cybersecurity Landscape? Threats and Countermeasures of IoT and BYOD, Cyber security concerns and solution in Smart City & Home Automation, Basics of Networking, GET MAC, NCPA.CPL, command line, Obtaining IP address from DHCP Server, IP address: types of IP's, Classes of IP's.IPV4 and IPV6 address, Sharing Files and Folder, Introduction to virtualization and installation of OS on virtual Box, Introduction to virtualization, Installation of virtual box, Installation of OS.		15

UNIT II Cyber Security, Web Browser Security and Firewall	**NOS**	**Hours**
Cyber Security: Password and its types, BIOS password, System password, Administrator password, User password, Password's storage – windows and Linux, Types of passwords attacks. **Web browser Security:** Understanding web browsers, Security features of different web browsers, Internet Explorer, Google Chrome, Firefox Mozilla, Opera. Firewall And UTM: **Understanding the Firewall, what exactly Unified Threat Management is? Use of Firewall and UTM, Advantages and Disadvantages of UTM.**		15

UNIT III Security and Malwares	NOS	Hours
Physical Security Understanding physical security, Need for physical security. Physical security equipment, Close circuit television cameras (CCTV), Analogue cameras, Digital cameras, Biometrics: Fingerprint, Iris, Retina, Face, Security tokens, Smart card. **Mobile Security** Different Mobile platforms, Mobile security features, Applications of mobile security, Different security options in mobile like encryption etc. **Email Security** What is E-mail? Understanding how Email works, Types of Email, how to set up spam filters? Prevent yourself from phishing, Use encryption. Keep your computer updated. **Malware** Different types of Malwares like viruses, Worms, Trojans, Ad wares, Spywares. Ransomware Rootkits, and Keyloggers etc., How to secure system from malware?		15
UNIT IV Ethical Hacking and Cyber Lows	**NOS**	**Hours**
Ethical hacking steps. Reconnaissance: Active reconnaissance, Passive reconnaissance Scanning: Port scanning, Network scanning, Vulnerability scanning, Gaining Access Maintaining Access Covering Tracks What is cyber law? Evolution of cyber law in India Jurisdiction of IT Act Penalties under IT Act. Difference between civil law and criminal law Offences under IT Act-some sections: Section 43, Section 65, Section 66, Section 67, Section 72, Section 69, Section 79.		15
	Total	60

Reference Book:

1. Security in Computing, Second Edition, C. P. Pfleeger, and S. L. Pfleeger, Pearson Education.
2. Computer Security: Art and Science, Second Edition, Matt Bishop, Pearson Education
3. Cryptography And Network Security: Principles and practice First Edition, Stallings,

B. Voc. Computer Technology

Semester: VI

Data Visualization Tools (General Education) CT.GE.602

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course helps students to learn concept of Data Visualization Tools such as Tableau and R Software.

Learning Outcomes:

After successful completion of this course, students will be able to:

- Understand Tableau Creator functionality required for new Tableau users.
- Starts with simple visualizations and moves to an in-depth look at the different chart and graph functions, calculations, mapping and other functionality.
- Build Interactive dashboards and share them with others
- Understand basics of Tableau and R Language.

Unit I Tableau Desktop part I	**NOS**	**Hours**
Creating Basic Visualizations, Creating Groups and Hierarchies, Bar chart, Geographic map, Crosstab report, Scatter plot, Line chart, Tableau Desktop UI, The Tableau product line, Workbook Windows, Visual cues, Tableau Prep, Connecting to Data Live connection, Extract data, combine data sources, Join tables, Blend data sources, Cross-database join, Filtering and Sorting data		15
Unit II Tableau Desktop part II	**NOS**	**Hours**
Creating Groups and Hierarchy, Date Functionality, Discrete and continuous dates, Fiscal dates, Mapping Geographic maps, filled maps, mapping options, Heat Map and Highlight Table, Difference between heat map and highlight, table, Calculations, Histogram Dashboards and Actions Dashboard design, Dashboards, Dashboard actions Filtering and Sorting Data Sharing your Work Tableau data source, Tableau data extract, Tableau workbook, Tableau packaged workbook		15
Unit III R Software Introduction	**NOS**	**Hours**
Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorized if-then else – Vector Equality – Vector Element names		15
Unit IV R Software: Graphs and Charts	**NOS**	**Hours**
Graphs and Charts Pie Charts, Bar Charts, Boxplots, Histograms, Line Graphs, Scatterplots		15
	Total	60

Reference Books:

1. Getting Started with Tableau 2019.2 (Second Edition) by Tristan Guillevin
2. Mastering Tableau 2019.1 (Second edition) by Marleen Meier, David Baldwin
3. The Art of R Programming: A Tour of Statistical Software Design by Norman Matloff, No Starch Press, 2011
4. R for Everyone: Advanced Analytics and Graphics Jared P. Lander
5. Beginning R – The Statistical Programming Language, Mark Gardener Wiley, 2013

B. Voc. Computer Technology

Semester: VI

Digital Marketing (General Education) CT.GE.603

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course helps students to learn concept of Digital Marketing, also this course teaches students how to market product using digital world.

Learning Outcomes:

After successful completion of this course, students will be able to:

- Understand basics of digital marketing.
- Gain an understanding of the processes that are involved in digital marketing using google AdWords, Facebook, Instagram.

Unit -I Introduction to Digital Marketing	**NOS**	**Hours**
Basic of Online Marketing, Difference of Internet Marketing vs Traditional Marketing, Search Engine Basics, Key points of internet marketing, Basic terms used in internet marketing, Effective platforms for promotions, why people moving in digital marketing? How much business can you grab after using internet marketing techniques? Structure of Online Marketing		15
Unit II Website Introduction & Creation	**NOS**	**Hours**
Understanding the web and its functioning, understanding need of website, Choosing Great Domains, Using CMS Panel and getting the hosting for website, Creating a professional and elegant website on WordPress		15
Unit III Search Engine Optimization	**NOS**	**Hours**
Introduction to SEO, Search Engine Working, Keyword, Research & Planning, On-Page SEO, Off-Page SEO, Link Building, Tools for SEO, Understanding Google Algorithm SEO Site Audit, Search Engine Marketing, what is Google AdWords, Google Ads Campaign, Search Campaign, Sale Campaign, Banner and Search Ads, Keyword Understanding Creating successful ads,		15
Unit IV Social Media Marketing	**NOS**	**Hours**
Introduction to Social Media Marketing, Facebook Marketing, Facebook Campaign Creation, Facebook for lead generation, Facebook Pixel, Instagram Marketing, Instagram Promotion or ad creation, Youtube Introduction, Understanding Youtube Algorithm, Growing Youtube Channel, LinkedIn Marketing, Twitter Marketing, Quora Marketing.		15

Reference book:

1. Digital Marketing Strategy: An Integrated Approach to Online Marketing 2nd Edition by Simon Kingsnorth
2. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns Hardcover – Illustrated, April 18, 2016

Online Support:

https://digitalfireflymarketing.com/wp-content/uploads/2017/02/Big-Book-of-Digital-Marketing.pdf

B. Voc. Computer Technology

Semester: VI

Android Application Development using Kotlin (Skill Component) CT.SC.601

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- This course helps students to learn concept of Kotlin, also this course teaches students how to develop applications for the Android operating system.

Learning Outcomes:

After successful completion of this course, students will be able to:

- Understand basics OOPs Concepts of Kotlin programming.
- Gain an understanding of the processes that are involved in an Android Application Development using Kotlin

Unit I Kotlin OOPs	**NOS**	**Hours**
Kotlin OOPs: Class and Object, Nested and Inner Class, Kotlin , Constructor ,Visibility Modifier, Kotlin Inheritance :Abstract Class, Kotlin Interface , Data Class, Sealed Class		15
Unit II Android Startup and Kotlin Android	**NOS**	**Hours**
Install Android Studio, The Activity And The User Interface Extract: Activity & UI Building The UI and a Calculator App Extract: starting with A First App, Android Events		15
Unit III Basic Controls and Layouts	**NOS**	**Hours**
Basic Controls: Extract Basic Controls, Extract More Controls **Layout Containers:** Extract Layouts - LinearLayout **The Constraint Layout**: Extract Bias & Chains		15
Unit IV Menus and Other Controls	**NOS**	**Hours**
Programming The UI: Extract Programming the UI, Extract Layouts and Autonaming Components, Menus & The Action Bar, Menus, Context & Popup, Spinners, Pickers		15
	Total	60

Reference Books:

1. "Kotlin in Action" Dmitry Jemerov, Svetlana Isakova -Manning Publications (2017)
2. "Kotlin for Android App Development" by Peter Sommerhoff.
3. Kotlin Notes For Professionals
4. Kotlin For Android developers by Antonio Leiva
5. Programming Kotlin by Stephen Samuel, Stefan Bocutiu

B. Voc. Computer Technology
Semester: VI

Programming in C#.net CT.SC.602

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- Working with Visual Studio
- To understand the .net environment
- Designing Forms and writing code
- To Create Database Connectivity

Learning Outcomes:

After successful completion of this course, students will be able to:

- Handle Visual Studio.
- Design form with menus, controls and write code.
- Work with Advance Controls
- Connect Front End with Back End
- Perform DML Operation

Unit I Introduction to .net, Arrays & Operators	**NOS**	**Hours**
What is .net, .net Framework, CLR, Visual Studio.net & .net Languages, Integrated Development Environment, Project types, c#.net History, Characteristics of c#, how c# differs from java, I/O Statement with C#.net, Boxing & Unboxing, Short Circuiting Operator, Defining classes, class members, creation of Object, Array & ArrayList class, Jagged Array, Hash Table, String Class.		15
Unit II Properties, Error Handling & Namespaces	**NOS**	**Hours**
Properties & its type, Event, Delegate & Multicast Delegate, Thread, Exception handling, try catch block, using finally block, custom Exception, using keyword, creating and using namespaces, interface, Method overloading & method overriding, Partial Class.		15
Unit III GUI Programming (Windows Application)	**NOS**	**Hours**
Event Driven Programming, Building windows application with visual studio TextBox, Label & Button Control, Combo Box, List Box, Check Box & Group Box Control DateTimePicker, Timer Control, Tree View, Building Menu, MDI Form, Picture Box, Progress Bar Control, Common Dialog boxes, Introduction to WPF.		15
Unit IV Database Programming	**NOS**	**Hours**
How Ado.net differs from Ado, Advantages of Ado.net, Connected & Disconnected Architecture, Dataset, Data Reader & Data Adapter, Managed Data Providers, Data Grid View Control, Developing Ado.net Based Application Insert, Update & Delete operation on table, Filling the Dataset.		15
	Total	60

Reference Books:

1. Programming in C# A Primer - Second Edition By – E Balagurusamy
2. .net 4.0 programming black book by Kogent Learning Solutions Inc.
3. C# 2010 programming black book by Kogent Learning Solutions Inc.

B. Voc. Computer Technology

Semester: VI

Test Engineering (Skill Component) CT.SC.603

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- Working with various Test tools
- To understand the why software testing is needed
- Designing Test cases and writing test cases
- To implementing own test case

Learning Outcomes:

After successful completion of this course, students will be able to:

- Test Projects
- Design and write own test cases
- Work with Advance Testing tools

Unit I Basics of Software Testing and Testing Methods	NOS	Hours
Software Testing, Objectives of Testing Failure, Error, Fault, Defect, Bug Terminology Test Case, When to Start and Stop Testing of Software (Entry and Exit Criteria) Verification and Validation (V Model). Quality Assurance Quality Control Methods of Testing: Static and dynamic Testing, The box approach White Box Testing Inspections. Walkthroughs, Technical Reviews Functional Testing, Code Coverage Testing. Code Complexity Testing, Black Box Testing: Requirements based testing, Boundary Value Analysis, Equivalence Partitioning		15
Unit II Types and levels of Testing	**NOS**	**Hours**
Levels of testing, Unit Testing: Driver, Stub, Integration Testing: Top-Down Integration. Bottom-Up integration, Bi-Directional Integration, Testing on web Application: Performance testing [Stress testing, Security Testing, Client-Sever testing] Acceptance Testing: Alpha Testing and Beta Testing, Special Tests: Regression Testing, GUI Testing		15
Unit III Test Management and Defect Management	**NOS**	**Hours**
Test Planning: Preparing a Test Plan, Deciding Test Approach, setting up Criteria for testing, Identifying Responsibilities, Staffing, Resource Requirements, Test Deliverables, Testing tasks Test Management: Test Infrastructure management, Test People management Test Process: Base Lining a Test Plan, Test Case Specification. Test Reporting: Executing Test Cases, Preparing Test Summery Report. Defect Classification, Defect management Process. Defect Life Cycle, defect Template Estimate Expected Impact of a defect, Techniques for finding Defects, Reporting a Defect		15

Unit IV Testing tools and Measurements	NOS	Hours
Manual Testing and Need for Automated Testing Tools Advantages and Disadvantages of Using Tools Selecting a testing Tools When to Use Automated Test tools, Testing using Automated Tools. Metrics and measurement: Types of metrics. Product metrics and process Metrics. Object oriented metrics in testing.		15
	Total	60

Reference Books:

1. Software Testing Principles and Practices - Srinivasan Desikan , Gopalaswamy Ramesh, Pearson publication
2. Software Testing: Principles, Techniques and tools - Limaye M.G., Tata McGraw Hill Education
3. Software Testing: Principle and Practices -Chauhan Naresh, Oxford University Press
4. Software Testing – Singh Yogesh, Cambridge University Press

B. Voc. Computer Technology
Semester: VI

Skill Laboratory Course-
Programming in C#.net CT.SC.PR1

Credit: 02 Periods: 60

(To be implemented from the Academic year 2020-2021)

Learning Objectives:

- Working With Visual Studio
- Designing Forms and writing code
- To Create Database Connectivity

Course Outcomes:

After successful completion of this course, students should be able to –

- Handle Visual Studio
- Design form with menus, controls and write code
- Work with Advance Controls
- Connect Front End with Back End
- Perform DML Operation

Practical List: -

1. Introduction to VisualStudio.net
2. Console application for I/O statement
3. Console application for each loop with Array class
4. Console application for Hash Table
5. Console application for Read Write properties
6. Console application for Exception Handling and Thread
7. Windows application for MDIform and Create Menus
8. Windows application to demonstrate Message Box and TextBox
9. Windows application to work with ComboBox and ListBox
10. Windows application to work with Progress Bar and Timer
11. Windows application to demonstrate Dialog Box
12. Windows application to work with Tree View
13. Windows application to connect with MS-Access and Oracle
14. Windows application to Perform DML operation on Table
15. Windows application to show database record in Data Grid View

B. Voc. Computer Technology

Semester: VI

Skill Laboratory Course-

Major Project including Industrial Visit CT.SC.PR2

Credit: 04 Periods: 60

(To be implemented from the Academic year 2020-2021)

Course objectives:

1. Become familiar with team work (team size of 3 to 5 students) for completion of industry projects and will learn how to partition a project between team members.
2. Learn to follow a formal development process to complete a project in a team.
3. Learn how to write a requirements document, specification document, and test plan document.
4. Learn how to implement their software and/or hardware project in a schedule-driven process based on their requirements and specification documents.
5. Learn how to test their project based on their test plan document.
6. Understand how to produce a final report (both oral and written), poster, and press release describing their project.
7. In the process of meeting the course requirements, students will experience all phases of project development and thereby will gain an appreciation of the demands of those project phases.

Course outcomes:

As a result of successfully completing this course, a student will be able to demonstrate mastery of the above course objectives as follows:

1. Successfully complete a major project working in a team with demonstrated ability to partition a project among multiple people.
2. Follow a formal development process (Waterfall or Agile) to successfully complete a major project with demonstrated knowledge of the process used exhibited in the weekly status reports.
3. Submit key development documents that meet minimum engineering standards for correctness, completeness, and clarity.
4. Implement a major project while meeting established milestone deadlines during the development process.
5. Demonstrate how testing resulted in a better product.
6. Present a final project presentation and demonstration that clearly shows that all project requirements were met and an analysis (cost, trade-offs, etc.) of how well they were met.
7. Demonstrate knowledge of all aspects of product development with a focus on the development process by correctly answering questions on a mini-exam.

Course Requirements:

The project completion process is:

- Project can be develop using C#, Kotlin, Java
- Weekly status reports
- Requirement's document
- Peer design review presentation and participation
- Specification document
- Test plan document

- Final project demo
- Final presentation and deliverables