

Annexure – I

Updated B.Voc.(Software Technologies) Structure (Semester III to VI)

Advanced Diploma in Software Technologies (Semester III and IV)

After successfully completing the courses of Semester-III and Semester IV, the students are expected to acquire the skills to be employable as **Desktop Publishing Associate, Agent- DTP, Graphic/Web Designer**

NSQF Level / Semester	Course Code	Course Title	Course Credits		Hours	Marks
Level 6 / Semester-III	General Education					
	STG 301	Data Structures	Theory	3	45	75
	STG 302	Audio and Visual Media	Theory	3	45	75
	STG 303	Reasoning Techniques	Theory	4	60	100
	STP 301	Software Laboratory - III	Practical	2	60	50
	Skill Development Qualification Pack					
	STS 301	Associate-Desktop Publishing - (SSC/Q2702)	Theory	7	435	300
			Practical	5		
Project/OJT/Internship			6			
Total				30	645	600
NSQF Level / Semester	Course Code	Course Title	Course Credits		Hours	Marks
Level 6 / Semester-IV	General Education					
	STG 401	Python Programming	Theory	3	45	75
	STG 402	Software Engineering & Testing	Theory	3	45	75
	STG 403	Creative Thinking	Theory	4	60	100
	STP 401	Software Laboratory - IV	Practical	2	60	50
	Skill Development Qualification Pack					
	STS 401	Associate-Desktop Publishing - (SSC/Q2702)	Theory	6	450	400
			Practical	6		
Project/OJT/Internship			6			
Total				30	660	700

B. Voc. Degree in Software Technologies (Semester V and VI)

After successfully completing the courses of Semester-V and Semester VI, the students are expected to acquire the skills to be employable as **Software/Application Developer (Also known as Software Analyst, Software Engineer, Systems Engineer, Programmer, Developer, Programmer Analyst)**

NSQF Level / Semester	Cours e Code	Course Title	Course Credits		Hour s	Mark s
Level 7 / Semester- V	General Education					
	STG 501	Mobile Application Development	Theory	3	45	75
	STG 502	Human Computer Interaction	Theory	3	45	75
	STG 503	Advanced Quantitative Techniques	Theory	4	60	100
	STP 501	Software Laboratory - V	Practical	2	60	50
	Skill Development Qualification Pack					
	STS 501	Software Developer - (SSC/Q0501)	Theory	7	435	300
			Practical	5		
			Project/OJT/Interns hip	6		
Total				30	645	600

NSQF Level / Semester	Cours e Code	Course Title	Course Credits	Hour s	Mark s	
Level 7 / Semester- VI	General Education					
	STG 601	RDBMS	Theory	3	45	75
	STG 602	Computer Networks	Theory	3	45	75
	STG 603	Entrepreneurship Development	Theory	4	60	100
	STP 601	Software Laboratory - VI	Practical	2	60	50
	Skill Development Qualification Pack					
	STS 601	Software Developer - (SSC/Q0501)	Theory	6	450	400
			Practical	6		
			Project/OJT/Interns hip	6		
Total				3 0	660	700

Annexure – II

Updated B.Voc.(Software Technologies) Skill Component Syllabus (Semester III to VI)

Semester III

Course Title: SSC/Q2702, Associate -DTP

Course Code: STS301

Marks: 300

Type: Skill (Theory, Practical, & Project/OJT)

Credits: 18 (Theory-7, Practical & Project/OJT-11)

Hours: 435

Course/Package objectives:

This Qualification Pack is to be taught in semester III & IV.

In semester III, students will learn to

- Understand and Provide/control access to publications
- Understand the concept of Color Theory, Layout Design & Visualization
- Knowledge and understanding of Designing & Publishing software
- Maintain a healthy, safe and secure working environment
- Provide data/information in standard formats

Key Learning Outcomes:

Students will have competencies and skills as mentioned in the Model Curriculum of Associate -DTP designed by NASSCOM (REFERENCE ID: SSC/Q2702, version 1.0)

Package Syllabus (Adopted Model Curriculum of SSC NASSCOM and added more topics, content & duration)

- *Lecture Hours as per Nasscom standard mentioned in the Model Curriculum with additions wherever required*
- *Marks Distribution as per Nasscom standard mentioned in Model Curriculum*
- *NOSs covered in semester III: SSC/N2702, SSC/N9003, and SSC/N9004*

	Topics /Content	Lecture (in Hours)
1.	Introduction to the Job Role and Industry	
	• Job Role and Responsibilities of an Associate DTP • An Introduction to the ITeS Sector • DTP Industry in India	3 Theory
2.	Color Theory & Psychology	
	Color Theory – Additive & subtractive -Terms to describe color, - color separation technique Direct & indirect method – GATF color triangles & color circle their use – modern color spaces -color matching – color original - color originals, selection	15 Theory 15 Practical

	and their characteristics – method of color measurement– color Gamut. Color Profiles .ico files Color Psychology: Color Symbolism, Color Psychology, and Historical & Contemporary use of Color. Local color and subjective use of color. Emotional effects. Personal Color preferences. Color psychology in context of Indian sub-continent. Practical (Preferably in Adobe Suite): • Color Scheme understanding and Implementation, • Tessellation of shapes (geometric and organic) with various colour schemes Introduction to Prepress color proofing: Type and factors in proofing, proofing methods- soft proof- digital proof photomechanical proof- press proof- other proofing methods	
3.	Layout Design & Visualization	
	Layout Design: Directing The Eye, Backwards Movement, Application Of Design Principles In Lay Out, Free Style Lay Out, Grid Design, Formats, Margins, Columns And Gutters, Page Depth, Working With Imagery, Borders And Rules. Consistency In Design: Creating Style Guides And Printing Instructions. Layout Visualization- magazine, newspaper, books, screen media etc. Creating a Suitable Grid, Title and Cover Policies. Selecting and Using Type family, White Space, Colour, Headlines, The Masthead etc. Practical (Preferably in Adobe Suite): • Layout Design for publication	15 Theory 15 Practical
4.	Designing and Publishing Tools	
	• Photoshop • CorelDraw/ Illustrator • InDesign	12 Theory 30 Practical
5.	Provide/control access to publications	
	• Check that different versions, including the most up-to-date versions, of publications are clearly indicated according to your organization's standards for version control Different Types of Support People May Need to Access Publications and How to Provide This Support • Check that publications, or specific versions of publications, are not already in the organization's knowledge base, in order to avoid duplication • Store publications in your organization's knowledge base according to your organization's policies, procedures and standards • provide support to appropriate people to access publications, where required	30 Theory 30 Practical

	Deal with Problems or Potential Conflicts with Access to Publications • Provide access to publications in your organization's knowledge base only to those who are entitled to access • Obtain advice and guidance on storing publications, version control and access issues from appropriate people, where required • Comply with your organization's policies, standards, procedures, guidelines and service level agreements (SLA) when providing and controlling access to publications	
6.	Maintain a healthy, safe and secure working environment	
	• Comply with your organization's current health, safety and security policies and procedures • Report any identified breaches in health, safety, and security policies and procedures to the designated person • Identify and correct any hazards that you can deal with safely, competently and within the limits of your authority • Report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • Follow your organization's emergency procedures promptly, calmly, and efficiently • Identify and recommend opportunities for improving health, safety, and security to the designated person • Complete any health and safety records legibly and accurately	15 Theory 30 Practical
7.	Provide data/information in standard formats	
	• Establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it • Obtain the data/information from reliable sources • Check that the data/information is accurate, complete and up-to-date • Obtain advice or guidance from appropriate people where there are problems with the data/information • Carry out rule-based analysis of the data/information, if required • Insert the data/information into the agreed formats • Check the accuracy of your work, involving colleagues where required • Report any unresolved anomalies in the data/information to appropriate people • Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time	15 Theory 30 Practical

Project (on/off Campus) / On-Job-Training (OJT) / Internship

Total Duration: 180 Hours

It is required by a student to carry-out and complete

- **On/ Off-Campus Project** in the relevant skill area (Desktop Publishing).
 - Project can be done individually or in group of maximum 5 students.
 - There shall be an internal project guide and external, if required.
 - After completion of the project, all the artifacts along with project report in relevant format to be submitted in the college for evaluation and feedback.

OR

- **OJT** in the relevant industry and in the relevant skill area (Desktop Publishing).
 - A Student needs to submit the detailed report of the OJT along with the 'Certificate of Completion' for evaluation and feedback.

OR

- **Internship** in the relevant industry and in the relevant skill area (Desktop Publishing).
 - A Student needs to submit the detailed report and work diary along with the 'Certificate of Completion' for evaluation and feedback.

Recommended Reference Books:

1. Participants Hand Book - Associate DTP, IT- ITeS Sector Skills Council NASSCOM, January 2020
2. Adams Morioka, Color Design Workbook: A Real World Guide to Using Color in Graphic Design, Rockport Publishers, 1st edition, March 2018
3. John T Draw, Color Management: A Comprehensive Guide for Graphic Designers, Allworth; 1st edition, 2012
4. Andrew Faulkner & Conrad Chavez, Adobe Photoshop CC Classroom in a Book, Paperback, Pearson Education, 1st edition, 2018
5. Brian Wood, Adobe Illustrator CC Classroom in a Book, Adobe, 1st edition, July 2013
6. Gary David Bouton, CorelDRAW X - Official Guide, TMH, 11th edition, November 2014
7. David E. Carter, The Big Book of Layouts, Harper Design, June 16th 2009
8. Beth Tondreau, Layout Essentials -100 Design Principles for Using Grids, Rockport Publishers, Jan 2019
9. Ambrose Harris, The Production Manual, AVA Publishing, 2008
10. Timothy Samara, Design Elements, a Graphic Style Manual, Rockport Publishers, 1st edition, April 2007

Qualification Pack Hyperlink:

<https://www.sscnasscom.com/qualification-pack/SSC/Q2702/>

Semester IV

Course Title: SSC/Q2702, Associate -DTP

Course Code: STS401

Marks: 400

Type: Skill (Theory, Practical, & Project/OJT)

Credits: 18 (Theory-6, Practical & Project/OJT-12)

Hours: 450

Course/Package objectives:

This Qualification Pack is to be taught in semester III & IV.

In semester IV, students will learn to

- Publish Content in different format
- Knowledge and understanding of Publishing Tool/software
- Understand SEO and its importance in optimizing the design and content
- Manage work to meet requirements
- Work effectively with colleagues
- Develop constructive work habits
- Develop your knowledge, skills and competence

Key Learning Outcomes:

Students will have competencies and skills as mentioned in the Model Curriculum of Associate -DTP designed by NASSCOM (REFERENCE ID: SSC/Q2702, version 1.0)

Package Syllabus (Adopted Model Curriculum of SSC NASSCOM and added more topics, content & duration)

- *Lecture Hours as per Nasscom standard mentioned in Model Curriculum with additions wherever required*
- *Marks Distribution as per Nasscom standard mentioned in Model Curriculum*
- *NOSs covered in semester IV: SSC/N2703, SSC/N9001, SSC/N9002, and SSC/N9005*

	Topics /Content	Duration (in Hours)
1.	Publishing Tools	
	• Adobe XD - Rapid prototyping and layout design for web and mobile apps • Adobe Spark - Free desktop publishing software for web and mobile. • Formatting content into standard templates using Desktop Publishing tools such as PageMaker, MS Word, MS Publisher, Adobe Acrobat, Adobe Flash, HTM or other formats	10 Theory 40 Practical
2.	Publish Content	
	How and When to Use different Types of Tools, Materials and Software Available for Publishing • Manipulate content into draft publications to meet requirements using standard templates and tools	20 Theory 35 Practical

	- Obtain and verify you have the correct versions of all content for publications Types of issues that may arise with specifications of content and how to deal with these - Establish clearly the requirements of the content of publications - Identify any issues with the requirements and clarify these with appropriate people Different Types of Content and Publications - Review draft publications with appropriate people and incorporate their inputs - Content development process - Create outputs of publications in formats required for production teams Current Practice for Publishing Content - Provide clear instructions for production teams, where required - Liaise with production teams to resolve any production issues - Update organization's knowledge base with publications	
3.	E – Publishing	
	Paper types and sizes, GSM, etc. Creating a book –Adding documents to the book – Synchronizing Style Source – Page numbering – Creating Table of Contents – indexing – Preflight – Exporting Documents – Exporting to E-book format – Printing technologies Interactive PDF and Other E-Pub Formats, Interaction Between Movies, Sound Clips URL's And Other E-Books, E-Publication for Various Platforms. Practical (Preferably in Adobe Suite): - Designing and Publishing Booklet, Portfolio, Books, Newspaper, Magazines - Designing and Publishing interactive PDF and Other E-Pub Formats, Kindle etc...	12 Theory 21 Practical
4.	SEO and Designing	
	Basics of SEO: Basic Description, Googlebot (Google Crawler), Google Updates and Algorithm, Search Engine Basics, Major Search Engines, Ranking algorithms and Page Rank, Web Designing Basics, Browsers and Imp Add-ons, Plugins, Important SEO Tools On-Page SEO: Keywords Research and Analysis, Initial Site Analysis, Competition Analysis, Keywords Density Analysis and Placement, Page Mapping, Title & Meta Tags Optimization, Site Structure Analysis, URL renaming/re-writing, H1, H2, H3 Tags, Anchor Text, Creating of Favicons, Existing Web Content Optimization, HTML Validation, No follow and do follow Links, Internal/External Links, Image Optimization, Outbound/Inbound Links, Creating/uploading XML Sitemap, Creating/uploading HTML Sitemap, Creating/uploading Robots file, Canonical Tag Optimization, How to host & register Site?, How to check Keywords Ranking?, 404 Error Removal and Redirects, 301 / 302 redirection, Header and Footer Optimization, Alexa report, Creating/uploading Google webmaster code,	12 Theory 21 Practical

	Creating/uploading Google Analytics code Practical: Design SEO Friendly Web Pages/ site	
5.	Manage your work to meet requirement	
	• Establish and agree your work requirements with appropriate people • Keep your immediate work area clean and tidy • Utilize your time effectively • Use resources correctly and efficiently • Treat confidential information correctly • Work in line with your organization's policies and procedures • Work within the limits of your job role • Obtain guidance from appropriate people, where necessary • Ensure your work meets the agreed requirements	11 Theory 23 Practical
6.	Work effectively with colleagues	
	• Communicate with colleagues clearly, concisely and accurately • Work with colleagues to integrate your work effectively with theirs • Pass on essential information to colleagues in line with organizational requirements • Work in ways that show respect for colleagues • Carry out commitments you have made to colleagues • Let colleagues know in good time if you cannot carry out your commitments, explaining the reasons • Identify any problems you have working with colleagues and take the initiative to solve these problems • Follow the organization's policies and procedures for working with colleagues	10 Theory 25 Practical
7.	Develop your knowledge, skills and competence	
	• Obtain advice and guidance from appropriate people to develop your knowledge, skills and competence • Identify accurately the knowledge and skills you need for your job role • Identify accurately your current level of knowledge, skills and competence and any learning and development needs • Agree with appropriate people a plan of learning and development activities to address your learning needs • Undertake learning and development activities in line with your plan • Apply your new knowledge and skills in the workplace, under supervision • Obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them • Review your knowledge, skills and competence regularly and take appropriate action	15 Theory 15 Practical

Project (on/off Campus) / On-Job-Training (OJT) / Internship

Total Duration: 180 Hours

It is required by a student to carry-out and complete

- **On/ Off-Campus Project** in the relevant skill area (Desktop Publishing).
 - Project can be done individually or in group of maximum 5 students.
 - There shall be an internal project guide and external, if required.
 - After completion of the project, all the artifacts along with project report in relevant format to be submitted in the college for evaluation and feedback.

OR

- **OJT** in the relevant industry and in the relevant skill area (Desktop Publishing).
 - A Student needs to submit the detailed report of the OJT along with the 'Certificate of Completion' for evaluation and feedback.

OR

- **Internship** in the relevant industry and in the relevant skill area (Desktop Publishing).
 - A Student needs to submit the detailed report and work diary along with the 'Certificate of Completion' for evaluation and feedback.

Recommended Reference Books:

1. Participants Hand Book - Associate DTP, IT- ITeS Sector Skills Council NASSCOM, January 2020
2. Chris Frost, Designing for Newspapers and Magazines, Routledge, 2nd edition, 2011
3. Pariah Burke, The Business of ePubublishing 2015 (ePublishing with InDesign Book 1) Kindle Edition, Pariah S. Burke, 2nd edition, March 2015
4. Pariah Burke, Creating Fixed-Layout eBooks, ePublishing with InDesign Kindle Edition, Pariah Burke (26 February 2013)
5. Kindle Direct Publishing, Building Your Book for Kindle, Amazon Digital Services, April 2012
6. Brian Wood, Adobe XD CC Classroom in a Book, Adobe Press, 2019
7. Peter Kent, Search Engine Optimization for Dummies, Wiley & Sons, 5th Edition
8. searchenginejournal.com

Qualification Pack Hyperlink:

<https://www.sscnasscom.com/qualification-pack/SSC/Q2702/>

Semester V

Course Title: SSC/Q0501, Software Developer
Project/OJT)

Type: Skill (Theory, Practical, &

Course Code: STS 501

Credits: 18 (Theory-7, Practical & Project/OJT-11)

Marks: 300

Hours: 435

Course/Package objectives:

This Qualification Pack is to be taught in semester V & VI.

In semester V, students will learn to

- Understand the IT-ITeS sector and the job profile of Software Developer.
- Demonstrate the understanding of algorithm analysis
- Comprehend various delivery models used in the IT Software Services industry.
- Demonstrate how algorithms are used to build and develop software applications.
- Implement appropriate standards to assist in performing software analysis and designing as per specifications.
- Understand different software models, methodologies and processes
- Implement various project and risk management understanding
- Identify software development needs and changes.
- Maintain a healthy, safe and secure working environment
- Provide data/information in standard formats

Learning Outcomes:

Students will have competencies and skills as mentioned in the Model Curriculum of Software Developer designed by NASSCOM (REFERENCE ID: SSC/Q0501, version 1.0)

Package Syllabus (Adopted Model Curriculum of SSC NASSCOM and added more topics, content & duration)

- *Lecture Hours as per Nasscom standard mentioned in the Model Curriculum with additions wherever required*
- *Marks Distribution as per Nasscom standard mentioned in Model Curriculum*
- *NOSs covered in semester V: SSC/N0501, SSC/N9001, and SSC/N9005*

	Topics /Content	Duration (in Hours)
1.	Introduction to the Job Role and Industry	
	• Explain the relevance of the IT-ITeS sector. • Collate information, evidence, and articles regarding the IT- ITeS/BPM industry. • List the various sub-sectors of the IT-ITeS industry. • Illustrate the key emerging trends in the IT- ITeS industry. • Identify key applications where software development is used. • List organizations in the IT-ITeS sector. • Identify the career path for a software developer • Identify the various categories of services and subsectors under the IT industry along with their scope. • Explain the importance of the IT Software Services sector in any organization. • Carry out research on global delivery models, which allow any organization to provide services to customers in an on-shore or off-shore basis. • List deployment issues of high capital investments, continuous business availability, turnaround time, communication costs, etc. in establishment of IT enabled services	4 Theory 6 Practical
2.	Algorithm Analysis	
	• Understand the role of algorithm in computing • Understand the framework of Analysis & Design of Algorithm ○ Use of pseudo code, analyzing running time (worst-average-best case), order of growth. e.g. insertion sort ○ Designing and analysis of Divide & Conquer algorithm - e.g. merge sort • Understand the growth of functions and simplifying the asymptotic analysis of algorithms ○ Understand Asymptotic Notations, functions, and running times ○ Understand Standard notations and common functions • Understand Divide & Conquer Approach ○ Understand Recurrences ○ Understand The maximum-sub array problem ○ Analyze Divide & Conquer algorithm ○ Understand Strassen's algorithm for matrix multiplication ○ Understand methods for solving recurrences: substitution, recursion-tree, master method	15 Theory 15 Practical
3.	Programming & Algorithms	
	• Illustrate various steps to construct the framework using an algorithm for a software application. • List the steps involved in solving computational problems. • Various translation problems, language translation issues • Execute simple programs, showing how input data is processed, output data is produced, and how the values of internal variables change. ○ Preferably use C, and C++/ Java Programming Language	15 Theory 30 Practical

	• Explain procedural languages • Concepts of functional and object-oriented programming languages • Major features of object-oriented programming • List the disadvantages of data flow diagrams. • Basic understanding of database management system. ○ Applications & uses, ER Diagram, Normalization, SQL language & various SQL commands • Deploy scripting language to automate tasks and write simple programs. • Use the error messages of the compiler to identify and correct mistakes in program syntax. • Implement testing strategies like unit, integration, regression, system, alpha, beta testing, etc. to identify and correct semantic errors in programs. • Understand concepts of Boolean Algebra: Boolean function, properties, canonical and standard form, Simplification of algebraic functions, Use of k-maps, Implement the Boolean function using k-maps, Implement SOP Boolean function using logic gates	
4.	Analysis & Design of Software Applications	
	• Define the Software Development Life Cycle encompassing Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD). • List the different techniques used for Requirements Analysis. • Analyze program inputs to identify, resolve and record design defects. • Choose the correct software programming procedure like procedure oriented, object-oriented or prototyping paradigms using principles of code and design quality. • Classify elements for measuring various aspects of software process. • Review software development designs to identify any bugs - arithmetic, logical, syntax, multithreading, interface and performance issues. • Understand software estimation, project estimation, cost estimation and time estimation • Understand CASE tools, its popular features, automated diagram support, and their scope	20 Theory 25 Practical
5.	Software Models, Methodologies and Project Management Concepts	
	• Understanding the different software models & methodologies and where to use it: Waterfall, v-shaped, spiral, prototype, iterative incremental, big bang, agile, object oriented, top-down programming and bottom-up programming, various cloud based services. • Understanding various agile methodologies: Extreme Programming (XP), Rapid Application Development (RAD), Rational Unified Process (RUP), Scrum Methodology, LEAN and KANBAN • Understand Software Quality Assurance (SQA): verification and validation, software quality assurance plan, software quality framework, various standards of ISO 9000 series of quality management system, capability maturity model • Understanding Secure DevOps: proactive focus on software security, DevOps	21 Theory 14 Practical

	principles, Testing tools for secure devOps, Describe veracode: leading tools for secure devOp • Understand Design Thinking problem solving process: Describe Design Thinking, qualities of Design Thinking, Design Thinking - the only way for the software development industry, Need of the Design Thinking • Explain Cross Domain Expertise and importance of domain expertise • Explain the software security and privacy, Importance of software security • Understand Software integration, systems integration, and overview of user interface design • Understanding essentials of Project Management: ○ Concept of software project, project manager, project management, manage a software project successfully, principles of software project management ○ project scheduling, Resource management, Project execution and monitoring, communication management, Configuration management, project management tool ○ Risk and risk management, identify and classify risks, types of risks, categories of risk management, five types of risk, risk management plan, software risk identification and software risk analysis, software risk planning and software risk monitoring	
6.	Maintain a healthy, safe and secure working environment	
	• Comply with organization's current health, safety and security policies and procedures. • Report any identified breaches in health, safety, and security policies and procedures to the designated person. • Identify and correct any hazards that can be dealt with safely, competently and within the limits of authority. • Report any hazards to the relevant person in line with organizational procedures and warn other people who may be affected. • List organization's emergency procedures. • Recommend improvement related to safety and security at the workplace	15 Theory 30 Practical
7.	Provide data/information in standard formats	
	• Establish and agree with appropriate people the data/information they need to provide, the formats in which they need to provide it, and when they need to provide it. • Check that the data/information is accurate, complete and up-to-date. • Record, control the document version and take appropriate approvals for the documents, plans or drawings according to organizational hierarchy. • Adhere to the organization's policies pertaining to accesses granted, usage, modification of any information or recording or destruction of information • Insert data/information into agreed formats. • Check accuracy of work, involving colleagues where required. • Report any unresolved anomalies in the data/information to appropriate people	15 Theory 30 Practical

Project (on/off Campus) / On-Job-Training (OJT) / Internship

Total Duration: 180 Hours

It is required by a student to carry-out and complete

- **On/ Off-Campus Project** in the relevant skill area (Software Developer).
 - Project can be done individually or in group of maximum 5 students.
 - There shall be an internal project guide and external, if required.
 - After completion of the project, all the artifacts along with project report in relevant format to be submitted in the college for evaluation and feedback.

OR

- **OJT** in the relevant industry and in the relevant skill area (Software Developer).
 - A Student needs to submit the detailed report of the OJT along with the 'Certificate of Completion' for evaluation and feedback.

OR

- **Internship** in the relevant industry and in the relevant skill area (Software Developer).
 - A Student needs to submit the detailed report and work diary along with the 'Certificate of Completion' for evaluation and feedback.

Recommended Reference Books:

1. Participants Hand Book – Software Developer, IT- ITeS Sector Skills Council NASSCOM, August 2019
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, 3rd (2009) or later edition
3. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education, 6th/7th edition.
4. Kathy Schwalbe, Introduction to Project Management, Course Technology, 6th edition
5. Craig Larman, Agile and Iterative Development: A manager's Guide, Addison Wesley, 2004
6. Hans Van Vliet, Software Engineering: Principles and Practices, Wiley, 2008 or later edition.

Qualification Pack Hyperlink:

<https://www.sscnasscom.com/qualification-pack/SSC/Q0501/>

Semester VI

Course Title: SSC/Q0501, Software Developer
Project/OJT)

Type: Skill (Theory, Practical, &

Course Code: STS 601

Credits: 18 (Theory-6, Practical & Project/OJT-12)

Marks: 400

Hours: 450

Course/Package objectives:

This Qualification Pack is to be taught in semester V & VI.

In semester VI, students will learn to

- Implement appropriate standards to assist in performing software construction as per the specifications and designs.
- Evaluate various software testing methodologies and identify the correct one to deploy.
- Identify software development needs and changes.
- Estimate problem designs for already built products or services.
- Discuss best practices for documenting business processes and major functionalities of an application.
- Develop strategies, apply critical thinking and provide appropriate recommendations for ethical decision-making.
- Collaborate with team to improve performance by providing data/information in standard formats and achieve the desired goals through efficient resource planning, continuous monitoring and clear correspondence.
- Manage work to meet requirements
- Work effectively with colleagues
- Develop constructive work habits
- Develop self knowledge, skills and competence

Learning Outcomes:

Students will have competencies and skills as mentioned in the Model Curriculum of Software Developer designed by NASSCOM (REFERENCE ID: SSC/Q0501, version 1.0)

Package Syllabus (Adopted Model Curriculum of SSC NASSCOM and added more topics, content & duration)

- *Lecture Hours as per Nasscom standard mentioned in the Model Curriculum with additions wherever required*
- *Marks Distribution as per Nasscom standard mentioned in Model Curriculum*
- *NOSs covered in semester VI: SSC/N0502, SSC/N9001, SSC/N9002, and SSC/N9005*

	Topics /Content	Duration (in Hours)
1.	Software Development	
	- List the phases of Software Development Lifecycle. - Differentiate between top down and bottom up design approaches. - Capture and analyze users' needs and then design, test, and develop software to meet those needs. - Categorize each piece of an application or system and plan how the pieces will work together. - Create a variety of models and diagrams that show customers, the software code needed for an application. - Use appropriate tools for building, debugging, testing, tuning, and maintaining programs. - Prepare a document capturing every aspect of an application or system as a reference for future maintenance and upgrades.	14 Theory 40 Practical
2.	Application Development	
	- List software quality attributes and characteristics of a good SRS. - Differentiate between custom application development and rapid application development. - Categorize the two generic approaches for software designing – top down and bottom up approach. - List the tools used for structured analysis namely Data Flow Diagrams (DFD), Structure Charts, HIPO, etc. - Develop a decision table based on number of conditions that may affect a decision. - Differentiate between UML and Object Oriented Design. - List various UML diagrams i.e. Class, Object, Use Case Sequence, Collaboration, etc. - Draw a Class Diagram of an Order System of an application.	25 Theory 37 Practical
3.	Software Testing and Maintenance	
	- Access reusable components, code generation tools and unit testing tools from organization's knowledge base. - Convert technical specifications into code to meet the requirements, leveraging reusable components, where available. - Explain validation and verification components covered under software testing. - Differentiate between manual and automated testing. - List the components of a test plan. - Create appropriate Unit Test Cases (UTCs). - Execute UTCs and document results. - Rework the code and UTCs to fix identified defects. - Understand debugging, role of debugging in software testing, process of the	15 Theory 40 Practical

	debugging, strategies of debugging, backtracking strategy, Debugging by testing • Explain Software maintenance, types of maintenance, Cost of maintenance, various maintenance activities • Understand and apply the concept of Software Re-engineering - Reverse engineering, Program restructuring, Forward engineering; Explain the component reusability, Describe the reuse process • Explain the customer support, Explain the customer interface and call management	
4.	Self and Work Management	
	• Describe the scope of work and working within limits of authority • Establish and agree to work requirements with appropriate people, as per hierarchy. • Keep your immediate work area clean and tidy. • Maintain a time chart against activities to display effective utilization of your time. • List resources correctly as per usage requirement. • Secure all confidential information, as per organization's policies and procedures	11 Theory 23 Practical
5.	Team Work and Communication	
	• Communicate with peers clearly, concisely and accurately. • Pass on essential information to peers in line with organizational requirements. • Demonstrate activities that show respect for colleagues. • Apprise peers in good time if any assigned task cannot be completed as per time commitments, explaining the reasons. • Identify any problems working with colleagues and take the initiative to solve these problems. • Explain the importance of following the organization's policies and procedures for working with colleagues	10 Theory 25 Practical
6.	Learning and Self Development	
	• Identify accurately the knowledge and skills needed for the job role. • Agree with appropriate people a plan of learning and development activities to address learning needs. • Undertake learning and development activities in line with plan. • Apply new knowledge and skills in the workplace, under supervision. • Obtain feedback from appropriate people on their knowledge and skills and how effectively can be applied. • Review knowledge, skills and competence regularly and take appropriate action.	15 Theory 15 Practical

Project (on/off Campus) / On-Job-Training (OJT) / Internship

Total Duration: 180 Hours

It is required by a student to carry-out and complete

- **On/ Off-Campus Project** in the relevant skill area (Software Developer).
 - Project can be done individually or in group of maximum 5 students.

- There shall be an internal project guide and external, if required.
- After completion of the project, all the artifacts along with project report in relevant format to be submitted in the college for evaluation and feedback.

OR

- **OJT** in the relevant industry and in the relevant skill area (Software Developer).
 - A Student needs to submit the detailed report of the OJT along with the 'Certificate of Completion' for evaluation and feedback.

OR

- **Internship** in the relevant industry and in the relevant skill area (Software Developer).
 - A Student needs to submit the detailed report and work diary along with the 'Certificate of Completion' for evaluation and feedback.

Recommended Reference Books:

1. Participants Hand Book – Software Developer, IT- ITeS Sector Skills Council NASSCOM, August 2019
2. Code Complete: A Practical Handbook of Software Construction, Microsoft Press, 2nd edition
3. Craig Larman, Agile and Iterative Development: A manager's Guide, Addison Wesley, 2004
4. Prentice Hall, Clean Code: A Handbook of Agile Software Craftsmanship, Prentice Hall, 1st edition
5. Hans Van Vliet, Software Engineering: Principles and Practices, Wiley, 2008 edition.
6. Ian Sommerville, Software Engineering, Pearson Education Asia, 2007 edition.
7. Jorgensen, P. Software Testing, A Craftsman's Approach, CRC Press: Boca, 4th or later edition
8. Copeland L., A Practitioner's Guide to Software Test Design, Artech House, 2004 or later edition

Qualification Pack Hyperlink:

<https://www.sscnasscom.com/qualification-pack/SSC/Q0501/>

Annexure – III
B.Voc.(Software Technologies)
General Education Component Syllabus (Semester VI)

Course Title: Software Laboratory – VI

Course Code: STP601

Marks: 50

Type: General Practical

Credits: 02

Hours: 60

Prerequisite Courses: STG601

Course objectives:

- To understand and implement the concepts learnt in Elective course STG601

Learning Outcome:

After successful completion of this course, the student will be able to

- Demonstrate the practical ability of the concepts learnt in elective course STG601

List of suggested Practical:

A student shall complete practical of minimum 50 Hours duration

Based on STG601

[60 Hours, 100% Marks]

1. Familiarization of the relational database: Data definition commands CREATE, ALTER, DROP, Adding Constraints Primary key, foreign key, unique key, check, not null. [10 Hours]
2. Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY, GROUP BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, IN, BETWEEN operator. [12 Hours]
3. Complex Queries, Nested Queries, EXISTS and UNIQUE, DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping. [12 Hours]
4. Programs involving views [06 Hours]
5. Programs involving cursors [06 Hours]
6. Programs involving triggers [06 Hours]
7. Stored procedures, stored procedures with parameters. [06 Hours]
8. Transaction Control Language(TCL) commands [02 Hours]

Recommended Books: *As mentioned in STG601*