

Model Curriculum

Software Developer

SECTOR: IT-ITES

SUB-SECTOR: IT SERVICES

OCCUPATION: DATA SCIENTISTS

REF. ID: SSC/Q0401, VERSION 1.0

NSQF LEVEL: 7



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

IT-ITES SECTOR SKILLS COUNCIL NASSCOM

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack: **Software Developer** QP No. **SSC/Q0501 NSQF Level 7**

Date of Issuance: December 31st, 2015

Valid up to*: December 31st, 2016

* Valid up to the next review date of the Qualification Pack



Authorised Signatory
Lakshmi Narayan
(Chairman, IT-ITES Sector Skills Council NASSCOM)

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Software Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Software Developer** in the **IT-ITeS** Sector/Industry and aims at building the following key competencies in the learner.

Program Name	Software Developer		
Qualification Pack Name & Reference ID.	Software Developer SSC/Q0501, version 1.0		
Version No.	1.0	Version Update Date	31/12/2015
Pre-requisites to Training	BSc (Stat, Math, Physics, Chemistry, Geology) or BE/ BTech		
Training Outcomes	After completing this programme, participants will be able to: • Contribute to the design of software products and applications • Develop software code to specification • Manage their work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop their knowledge, skills and competence		

The Course encompasses all seven National Occupational Standards (NOS) of Software Developer SSC/Q0501 Qualification Pack issued by IT-ITeS Sector Skills Council NASSCOM.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	Programming and Algorithms Theory Duration (hh:mm) 20:00 Practical Duration (hh:mm) 30:00 Corresponding NOS Code SSC/N0501	Candidates will be able to: Design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD	Refer to Unique Equipment Required Section
2	Analysis and Design of Software Applications Theory Duration (hh:mm) 20:00 Practical Duration (hh:mm) 30:00 Corresponding NOS Code SSC/N0501	Candidates will be able to: - Check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people - Check their understanding of the Software Requirements Specification (SRS) with appropriate people - Check their understanding of High Level Design (HLD) with appropriate people - Review their designs with appropriate people - Analyse inputs from appropriate people to identify, resolve and record design defects and inform future designs - Document designs using standard templates and tools - Comply with organization's policies, procedures and guidelines when contributing to the design of software products and applications	Refer to Unique Equipment Required Section
3	Application Development Theory Duration (hh:mm) 20:00 Practical Duration (hh:mm) 80:00 Corresponding NOS Code SSC/N0502	Candidates will be able to: - Check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people - Access reusable components, code generation tools and unit testing tools from their organization's knowledge base - Convert technical specifications into code to meet the requirements, leveraging reusable components, where available - Create appropriate unit test cases (UTCs) - Review codes and UTCs with appropriate people - Execute UTCs and document results - Rework the code and UTCs to fix identified defects	Refer to Unique Equipment Required Section

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		- Analyse inputs from appropriate people to inform future designs - Record corrective actions for identified defects to inform future designs - Submit tested code timely for approval by appropriate people - Update their organization's knowledge base with their experiences of the code developed - Comply with their organization's policies, procedures and guidelines when developing software code to specification	
4	Self and work Management Theory Duration (hh:mm) 12:00 Practical Duration (hh:mm) 38:00 Corresponding NOS Code SSC/N9001	Candidates will be able to: - Establish and agree their work requirements with appropriate people - Keep their immediate work area clean and tidy - utilize their time effectively - Use resources correctly and efficiently - Treat confidential information correctly - Work in line with organization's policies and procedures - Work within the limits of their job role - Obtain guidance from appropriate people, where necessary - Ensure their work meets the agreed requirements	Refer to Unique Equipment Required Section
5	Team Work and Communication Theory Duration (hh:mm) 12:00 Practical Duration (hh:mm) 38:00 Corresponding NOS Code SSC/N9002	Candidates will be able to: - Communicate with colleagues clearly, concisely and accurately - Work with colleagues to integrate their work effectively with them - Pass on essential information to colleagues in line with organizational requirements - Work in ways that show respect for colleagues - carry out commitments they have made to colleagues - Let colleagues know in good time if they cannot carry out their commitments, explaining the reasons - Identify any problems they have working with colleagues and take the initiative to solve these problems - Follow the organization's policies and procedures for working with colleagues	Refer to Unique Equipment Required Section
6	Managing Health and Safety Theory Duration (hh:mm) 05:00	Candidates will be able to: - Comply with their 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 they can deal	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 20:00 Corresponding NOS Code SSC/ N 9003	with safely, competently and within the limits of their authority - Report any hazards that they are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected - Follow their 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	
7	Data and Information Management Theory Duration (hh:mm) 15:00 Practical Duration (hh:mm) 35:00 Corresponding NOS Code SSC/N9004	Candidates will be able to: - 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 - 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 their 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	Refer to Unique Equipment Required Section
8	Learning and Self Development Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 20:00 Corresponding NOS Code SSC/N9005	Candidates will be able to: - Obtain advice and guidance from appropriate people to develop their knowledge, skills and competence - Identify accurately the knowledge and skills they need for their job role - Identify accurately their 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 their learning needs - Undertake learning and development activities in line with their plan - Apply their new knowledge and skills in the workplace, under supervision - Obtain feedback from appropriate people on their	Refer to Unique Equipment Required Section

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		knowledge and skills and how effectively they apply them Review their knowledge, skills and competence regularly and take appropriate action	
	Total Duration Theory Duration 109:00 Practical Duration 291:00	Unique Equipment Required: Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome. For Domain NOSs: - For NOS SSC/N0501: C/C++, UML tools such as Rational suite - For NOS SSC/N0502: JDK / Eclipse General: - Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning - White Board, Markers and Eraser - Projector with screen - Flip chart with markers - Faculty's PC/Laptop with latest configuration and internet connection - Supporting software / applications for projecting audio, video, recording, Presentation Tools to support learning activities: - Intranet - Email - IMs - Learning management system e.g. Moodle, Blackboard to enable blended learning - Microphone / voice system for lecture and class activities - Handy Camera - Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets - For IT Lab sessions: Computer Lab with 1:1 PC: trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook/ other Email Clients - Assessment and Test Tools for day to day online Tests and Assessments - For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. - Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session.	

Grand Total Course Duration: 400 Hours 0 Minutes

(This Syllabus/Curriculum has been approved by IT-ITeS Sector Skills Council NASSCOM.)

Notes from IT-ITeS Sector Skills Council

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required to communicate results of testing (in SSC/N0501) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,
 - a. Embed such skills development in the learning pedagogy for each expected outcome
 - b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
 - c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration, and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Trainer Prerequisites for Job role: Software Developer mapped to Qualification Pack: SSC/Q0501

Sr. No.	Area	Details
1	Job Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0501.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	Minimum Educational Qualifications	Minimum Bachelor's Degree in Computer Science or any related field; Preferred Master's Degree in Computer Science
4a	Domain Certification	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0501. Certification in relevant software competencies: Software Development Certifications in C++, Embedded, C#, C, Java etc., is an added advantage.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/Q1402". Minimum accepted score is 70%.
5	Experience	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred

Annexure: Assessment Criteria

Assessment Criteria for Software Developer	
Job Role	Software Developer
Qualification Pack	SSC/Q0501
Sector Skill Council	IT-ITeS

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com .

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTIC AL
1.SSC/N0501 (CONTRIBUTE TO THE DESIGN OF SOFTWARE PRODUCTS AND APPLICATIONS)	PC1. check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	100	10	10	0
	PC2. check their understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check their understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review their designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	0	15
	PC7. document their designs using standard templates and tools		10	0	10
	PC8. comply with their organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
		Total	100	35	65
2.SSC/N0502 (DEVELOP SOFTWARE CODE TO SPECIFICATION)	PC1. check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	100	5	5	0
	PC2. access reusable components, code generation tools and unit testing tools from their organization's knowledge base		5	0	5
	PC3. convert technical specifications into code to meet the requirements, leveraging reusable components, where available		30	0	30
	PC4. create appropriate unit test cases (UTCs)		10	0	10
	PC5. review codes and UTCs with appropriate people		5	5	0
	PC6. execute UTCs and document results		5	0	5
	PC7. rework the code and UTCs to fix identified defects		10	0	10
	PC8. analyze inputs from appropriate people to inform future designs		5	5	0
	PC9. record corrective actions for identified defects to inform future designs		10	0	10
			5	5	0

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
	PC10. submit tested code for approval by appropriate people				
	PC11. update their organization's knowledge base with their experiences of the code developed		5	0	5
	PC12. comply with their organization's policies, procedures and guidelines when developing software code to specification		5	0	5
	Total	100	100	20	80
3.NOS/N9001 (MANAGE THEIR WORK TO MEET REQUIREMENTS)	PC1. establish and agree their work requirements with appropriate people	100	6.25	0	6.25
	PC2. keep their immediate work area clean and tidy		12.5	6.25	6.25
	PC3. utilize their time effectively		12.5	6.25	6.25
	PC4. use resources correctly and efficiently		18.75	6.25	12.5
	PC5. treat confidential information correctly		6.25	0	6.25
	PC6. work in line with their organization's policies and procedures		12.5	0	12.5
	PC7. work within the limits of their job role		6.25	0	6.25
	PC8. obtain guidance from appropriate people, where necessary		6.25	0	6.25
	PC9. ensure their work meets the agreed requirements		18.75	6.25	12.5
	Total	100	100	25	75
4.SSC/N9002 (WORK EFFECTIVELY WITH COLLEAGUES)	PC1. communicate with colleagues clearly, concisely and accurately	100	20	0	20
	PC2. work with colleagues to integrate their work effectively with theirs		10	0	10
	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10
	PC6. let colleagues know in good time if you cannot carry out their commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
	Total	100	100	20	80
5.SSC/N9003 (MAINTAIN A	PC1. comply with their organization's current health, safety and security policies and procedures	100	20	10	10

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
HEALTHY, SAFE AND SECURE WORKING ENVIRONMENT)	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of their authority		20	10	10
	PC4. 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		10	0	10
	PC5. follow their organization's emergency procedures promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
	Total	100	30	70	
6.SSC/N9004 (PROVIDE DATA/INFORMATION IN STANDARD FORMATS)	PC1. 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	100	12.5	12.5	0
	PC2. obtain the data/information from reliable sources		12.5	0	12.5
	PC3. check that the data/information is accurate, complete and up-to-date		12.5	6.25	6.25
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		6.25	0	6.25
	PC5. carry out rule-based analysis of the data/information, if required		25	0	25
	PC6. insert the data/information into the agreed formats		12.5	0	12.5
	PC7. check the accuracy of their work, involving colleagues where required		6.25	0	6.25
	PC8. report any unresolved anomalies in the data/information to appropriate people		6.25	6.25	0
	PC9. provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		6.25	0	6.25
	Total	100	25	75	
7.SSC/N9005 (DEVELOP THEIR KNOWLEDGE, SKILLS AND COMPETENCE)	PC1. obtain advice and guidance from appropriate people to develop their knowledge, skills and competence	100	10	0	10
	PC2. identify accurately the knowledge and skills you need for their job role		10	0	10
	PC3. identify accurately their current level of		20	10	10

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
	knowledge, skills and competence and any learning and development needs				
	PC4. agree with appropriate people a plan of learning and development activities to address their learning needs		10	0	10
	PC5. undertake learning and development activities in line with their plan		20	10	10
	PC6. apply their new knowledge and skills in the workplace, under supervision		10	0	10
	PC7. obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them		10	0	10
	PC8. review their knowledge, skills and competence regularly and take appropriate action		10	0	10
		Total	100	20	80



IT-ITeS Sector Skill Council

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