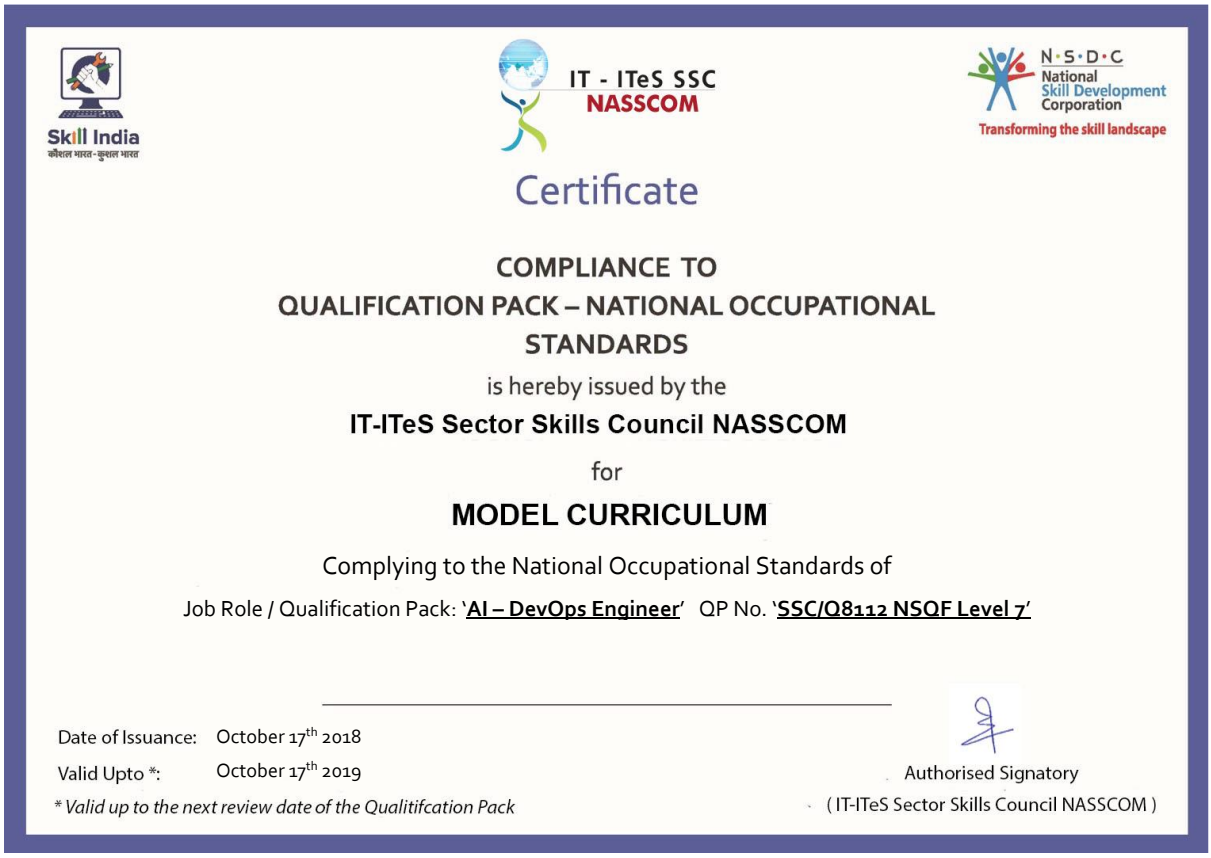
Model Curriculum

AI – DevOps Engineer

SECTOR: IT-ITeS
SUB-SECTOR: FUTURE SKILLS
OCCUPATION: ARTIFICIAL INTELLIGENCE & BIG DATA ANALYTICS
REF ID: SSC/Q8112, V1.0
NSQF LEVEL: 7


Skill India
IT - ITeS SSC NASSCOM
N·S·D·C National Skill Development Corporation
Transforming the skill landscape
Certificate
COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS
is hereby issued by the
IT-ITeS Sector Skills Council NASSCOM
for
MODEL CURRICULUM
Complying to the National Occupational Standards of
Job Role / Qualification Pack: 'AI – DevOps Engineer' QP No. 'SSC/Q8112 NSQF Level 7'
Date of Issuance: October 17th 2018
Valid Upto *: October 17th 2019
* Valid up to the next review date of the Qualitifcation Pack
Authorised Signatory
(IT-ITeS Sector Skills Council NASSCOM)

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AI – DevOps Engineer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "AI – DevOps Engineer", in the "IT-ITeS" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**AI – DevOps Engineer**		
Qualification Pack Name and Reference ID.	SSC/Q8112, V1.0		
Version No.	1.0	**Version Update Date**	17/10/2018
Pre-requisites to Training	Bachelor's Degree in Engineering / Technology / Statistics / Mathematics / Computer Science		
Training Outcomes	**After completing this programme, participants will be able to:** • Explain the nature of work across the IT-ITeS sector, the various sub sectors and their evolution. • Elaborate the various occupations under the Future Skills sub sector and the impact of these on organizations and businesses. • Discuss the growing importance of AI and Big Data Analytics and its impact on the society. • Assess global standards and regulations for aspects of data administration and governance such as storage, security, privacy and monitoring. • Assess the different phases of a continuous integration and deployment (CI/CD) pipeline such as build, unit test, deploy, auto test, deploy to production, etc. • Use different tools for build and test automation such as Puppet, Chef, Jenkins, SaltStack, Selenium, etc. • Use different tools for configuration management such as Puppet, Chef, Ansible, etc. • Apply the concepts of containerization using tools such as Docker, Kubernetes, Nagios, etc. • Plan their schedules and timelines based on the nature of work. • Demonstrate how to communicate and work effectively with colleagues. • Use different approaches to effectively manage and share data. • Design a structured plan for self-learning and development. • Develop strong relationships at the workplace through effective communication and conflict management. • Apply the principles of persuasive communication for negotiations and discussions.		

This course encompasses 7 out of 7 National Occupational Standards (NOS) of "AI – DevOps Engineer" Qualification Pack issued by "IT-ITeS Sector Skills Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required

1	**IT-ITeS Sector – An Introduction**
	
	Theory Duration (hh:mm) 06:00
	Practical Duration (hh:mm) 03:00
	
	Corresponding NOS Code
	Bridge Module
		• Explain the relevance of the IT-ITeS sector
		• State the various sub-sectors in the IT-ITeS sector
		• Detail the nature of work performed across the sub-sectors
		• Identify and list organizations in the sector
		• Discuss the evolution of the sub sectors and the way forward
		• Explain the disruptions happening across the IT-ITeS sector
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following: -
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)
			  • Chart paper and sketch pens

2	**Future Skills – An Introduction**
	
	Theory Duration (hh:mm) 01:00
	Practical Duration (hh:mm) 01:00
	
	Corresponding NOS Code
	Bridge Module
		• Define the general overview of the Future Skills sub-sector
		• Describe the profile of the Future Skills sub-sector
		• Explain the various occupations under this sub-sector
		• List key trends across the occupations in this sub-sector
		• List various roles in the Future Skills sub-sector
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with WiFi (Min 2 Mbps Dedicated)

3	**Artificial Intelligence & Big Data Analytics – An Introduction**
	
	Theory Duration (hh:mm)
	04:00
	
	Practical Duration (hh:mm)
	02:00
	
	Corresponding NOS Code
	Bridge Module
		• Explain the relevance of AI & Big Data Analytics for the society
		• Explain a general overview of AI & Big Data Analytics and its roles
		• Define a career map for roles in AI & Big Data Analytics
		• Explain the role of a DevOps Engineer and his/her key responsibilities
		• List the range of skills and behavior, expected from a DevOps Engineer
		• State the growth opportunities for a DevOps Engineer
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)

4	**Global Regulations and Standards**
	
	Theory Duration (hh:mm)
	13:00
	
	Practical Duration (hh:mm)
	17:00
	
	Corresponding NOS Code
	Bridge Module
		• Assess global standards for data storage, security, privacy and monitoring
		• Assess the variances in standards for data storage, security, privacy and monitoring across different industries
		• Evaluate the implications of standards and regulations on data administration and governance
		• Comply with standards and regulations in their field of work
		• Develop forecasts and checks to accommodate any changes in standards or regulations
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)

5	**Administration Tools and Usage**
	
	Theory Duration (hh:mm)
	08:00
	
	Practical Duration (hh:mm)
	12:00
	
	Corresponding NOS Code
	Bridge Module
		• Distinguish between the pros and cons of different data administration tools, frameworks and microservices
		• Comprehend the basics of different infrastructure components such as storage devices, networking hardware, server-storage connectivity, virtualization technologies
		• Analyze the applications and limitations of different computing platforms
		• Analyze the applications and limitations of different microservices, frameworks, libraries, packages
		• Analyze the applications and limitations of various server authentication, network security and virus protection tools
		• Analyze the applications and limitations of various tools for configuration management, continuous integration, development and test automation
		• Apply the basic functionalities of different data administration tools, frameworks and microservices
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)
			  • Latest versions of various data administration tools, frameworks and microservices
			  • Latest versions of server authentication, network security and virus protection tools
			  • Latest versions of configuration management, continuous integration, development and test automation tools

6	**Developing a CI/CD Pipeline**
	
	Theory Duration (hh:mm)
	15:00
	
	Practical Duration (hh:mm)
	10:00
	
	Corresponding NOS Code
	SSC/N8120
		• Assess the different aspects of continuous integration and deployment (CI/CD)
		• Assess different models for continuous integration and deployment
		• List the different phases of a CI/CD pipeline
		• Distinguish how a CI/CD pipeline might change for different products such as desktop applications, mobile applications, or web applications
		• Select suitable performance metrics for the CI/CD pipeline
		• Apply different methods to optimize communication, workflow and feedback loops
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)

7	**Build and Test Automation**
	
	Theory Duration (hh:mm)
	15:00
	
	Practical Duration (hh:mm)
	35:00
	
	Corresponding NOS Code
	SSC/N8120
		• Comprehend the importance of version control in build and test automation
		• Develop a CI/CD pipeline that incorporates automated development and testing
		• Develop an integrated development environment for different types of products
		• Apply different approaches to integrate different build and test automation tools
		• Develop a staging environment for production
		• Use different tools for continuous integration such as Chef, Puppet, Jenkins, SaltStack
		• Use different tools for test automation such as Selenium
		• Use different tools for application release
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)

		automation such as Kubernetes, Docker, Puppet • Apply different code quality principles • Assess the quality of the source code	

8	**Configuration Management**
	
	Theory Duration (hh:mm)
	15:00
	
	Practical Duration (hh:mm)
	35:00
	
	Corresponding NOS Code
	SSC/N8120
		• Comprehend the principles and the necessity for configuration management
		• Use different tools for configuration management such as Puppet, Chef, Ansible
		• Comprehend the principles of master-agent architecture in configuration management tools such as Puppet
		• Setup a master-agent architecture using a configuration management tool such as Puppet
		• Apply different approaches to configure roles in configuration management tools such as Ansible
		• Use playbooks to manage configurations of remote machines, sequence multi-tier rollouts and delegate actions to other hosts
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)

9	**Containerization**
	
	Theory Duration (hh:mm)
	15:00
	
	Practical Duration (hh:mm)
	35:00
	
	Corresponding NOS Code
	SSC/N8120
		• Apply the different concepts behind containerization using tools such as Docker or Kubernetes
		• Assess the lifecycle of a container
		• Implement images and containers using tools such as Docker
		• Apply the principles behind container integration and networking
		• Use Docker Swarm to integrate different containers
		• Comprehend the architecture behind a Kubernetes cluster
		• Create a deployment in Kubernetes using YAML
		• Use Kubernetes Dashboard to deploy applications
		• Demonstrate how to use infrastructure as a code for server management
		• Use tools such as Nagios to monitor different servers
			• Whiteboard and Markers
			• LCD Projector and Laptop for presentations
			• Lab equipped with the following:
			  • PCs/Laptops
			  • Internet with Wi-Fi (Min 2 Mbps Dedicated)

10	**Manage Your Work to Meet Requirements** **Theory Duration (hh:mm)** **12:00** **Practical Duration (hh:mm)** **38:00** **Corresponding NOS Code** **SSC/N9001**	• Define scope of work and working within limits of authority • Summarize the details of the work and work environment • Recognize the importance of maintaining confidentiality	• Whiteboard and Markers • LCD Projector and Laptop for presentations

11	**Work Effectively with Colleagues** **Theory Duration (hh:mm)** **12:00** **Practical Duration (hh:mm)** **38:00** **Corresponding NOS Code** **SSC/N9002**	• Use different methods and mechanisms for effective communication • Recognize the importance of working effectively	• Whiteboard and Markers • LCD Projector and Laptop for presentations • Provision to write emails and send in the lab • Lab with provision for internet, email, word processor and presentation software • Chart paper, markers, picture magazines and old newspapers
12	**Provide Data / Information in Standard Formats** **Theory Duration (hh:mm)** **12:00** **Practical Duration (hh:mm)** **38:00** **Corresponding NOS Code** **SSC/N9004**	• Apply the concepts behind information and knowledge management • Describe how data / information can be managed effectively • Apply skills required to manage data and information effectively	• Whiteboard and Markers • LCD Projector and Laptop for presentations • Provision for online research in the lab
13	**Develop Knowledge, Skills and Competence** **Theory Duration (hh:mm)** **06:00** **Practical Duration (hh:mm)** **19:00** **Corresponding NOS Code** **SSC/N9005**	• Recognize the importance of self-development • Identify knowledge and skills required for the job • Identify avenues for self-development • Create plans for self-development	• Whiteboard and Markers • LCD Projector and Laptop for presentations • Provision for online access to all students in the lab

14	**Build and Maintain Relationships at the Workplace** **Theory Duration (hh:mm)** **10:00** **Practical Duration (hh:mm)** **15:00** **Corresponding NOS Code** **SSC/N9006**	• Recognize the importance of open and effective communication • Apply different approaches for conflict management • Apply different approaches to boost recognition and motivation	• Whiteboard and Markers • LCD Projector and Laptop for presentations • Lab with provision for internet, email, word processor and presentation software • Chart paper, markers, picture magazines and old newspapers
15	**Persuasive Communication** **Theory Duration (hh:mm)** **10:00** **Practical Duration (hh:mm)** **15:00** **Corresponding NOS Code** **SSC/N9010**	• Identify different requirements and how to adapt to each distinct requirement • Demonstrate how to use evidences to support arguments	• Whiteboard and Markers • LCD Projector and Laptop for presentations • Lab with provision for internet, email, word processor and presentation software • Chart paper, markers, picture magazines and old newspapers

	Total Duration:
	
	Theory Duration 154:00
	
	Practical Duration 313:00
		Unique Equipment Required
		• Whiteboard and Markers
		• LCD Projector and Laptop for presentations
		• Lab equipped with the following: -
		  ◦ PCs/Laptops
		  ◦ Internet with Wi-Fi (Min 2 Mbps Dedicated)
		  ◦ Chart paper and sketch pens
		  ◦ Latest versions of various data administration tools, frameworks and microservices
		  ◦ Latest versions of server authentication, network security and virus protection tools
		  ◦ Latest versions of configuration management, continuous integration, development and test automation tools
		• Chart paper, markers, picture magazines and old newspapers
		
		Popular Software Tools
		Development environment software: Apache Maven, PowerShell, Docker
		Application release automation software: Kubernetes, Docker, Puppet	

		Continuous integration software: Chef, Puppet, Jenkins, SaltStack Configuration management software: Puppet, Chef, Ansible Workflow management software: Jira Cluster management software: Kubernetes, Apache Mesos, Docker Swarm Network monitoring software: Nagios, Sniffer Investigator

Grand Total Course Duration: 467 Hours, 0 Minutes

*(This syllabus/ curriculum has been approved by **SSC: IT- ITeS Sector Skills Council NASSCOM**)*

Trainer Prerequisites for Job role: "AI – DevOps Engineer" mapped to Qualification Pack: "SSC/Q8112, V1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q8112, V1.0
2	**Personal Attributes**	This job may require the individual to work independently and take decisions for his/her own area of work. The individual should have a high level of analytical thinking ability, passion for Artificial Intelligence and Big Data Analytics, and attention for detail, should be ethical, compliance and result oriented, should also be able to demonstrate interpersonal skills, along with willingness to undertake desk-based job with long working hours.
3	**Minimum Educational Qualifications**	Graduate in any discipline preferably Science/Computer Science/Electronics and Engineering /Information Technology
4a	**Domain Certification**	Certified for Job Role: "AI – DevOps Engineer" mapped to QP: "SSC/Q8112, V1.0". Minimum accepted score is 80%
4b	**Platform Certification**	Recommended that the trainer is certified for the Job role "Trainer" mapped to the Qualification Pack "MEP/Q0102". Minimum accepted score is 80% aggregate
5	**Experience**	5+ years of work experience/internship in DevOps Engineer or related roles

Criteria For Assessment Of Trainees

Job Role AI – DevOps Engineer

Qualification Pack SSC/Q8112, V1.0

Sector Skill Council IT-ITeS

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.

3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.

4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.

6. To pass a QP, a trainee should score an average of 70% across generic NOS' and a minimum of 70% for each technical NOS

7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS Total Marks: 700				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
1. SSC/N8119 Manage administration of production systems and operations	PC1. define continuous delivery and integration strategies	100	15	5	10
	PC2. design and develop staging environments before production		10	3	7
	PC3. deploy, automate and maintain production systems		15	5	10
	PC4. evaluate new technology options and vendor products		5	2	3
	PC5. handle build, release and configuration management of production systems		15	5	10
	PC6. manage and provision data centers through machine-readable definition files		10	2	8
	PC7. define and execute continuous testing and automated QA processes		10	2	8
	PC8. troubleshoot and solve system issues across platform and application domains		10	3	7
	PC9. ensure availability, performance and scalability of production systems		10	3	7
	Total		**100**	**30**	**70**
2. SSC/N9001 Manage your work to meet requirements	PC1. establish and agree your work requirements with appropriate people	100	6.25	0	6.25
	PC2. keep your immediate work area clean and tidy		12.5	6.25	6.25

Compulsory NOS Total Marks: 700				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC3. utilize your 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 your organization's policies and procedures		12.5	0	12.5
	PC7. work within the limits of your job role		6.25	0	6.25
	PC8. obtain guidance from appropriate people, where necessary		6.25	0	6.25
	PC9. ensure your work meets the agreed requirements		18.75	6.25	12.5
	Total		**100**	**25**	**75**
3. SSC/N9002 Work effectively with colleagues	PC1. communicate with colleagues clearly, concisely and accurately	100	20	0	20
	PC2. work with colleagues to integrate your work effectively with them		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		10	10	0

Compulsory NOS Total Marks: 700				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	carry out your commitments, explaining the reasons				
	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**	**20**	**80**
4. 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

Compulsory NOS Total Marks: 700				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC7. check the accuracy of your 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**
5. SSC/N9005 Develop your knowledge, skills and competence	PC1. obtain advice and guidance from appropriate people to develop your knowledge, skills and competence	100	10	0	10
	PC2. identify accurately the knowledge and skills you need for your job role		10	0	10
	PC3. identify accurately your current level of knowledge, skills and competence and any learning and development needs		20	10	10
	PC4. agree with appropriate people a plan of learning and development activities to address your learning needs		10	0	10
	PC5. undertake learning and development activities in line with your plan		20	10	10
	PC6. apply your new knowledge and skills in		10	0	10

Compulsory NOS Total Marks: 700				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	the workplace, under supervision				
	PC7. obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them		10	0	10
	PC8. review your knowledge, skills and competence regularly and take appropriate action		10	0	10
	Total		**100**	**20**	**80**
6. SSC/N9006 Build and maintain relationships at the workplace	PC1. build rapport with appropriate people at the workplace	100	10	3	7
	PC2. develop new professional relationships		10	3	7
	PC3. build alliances to establish mutually beneficial working arrangements		10	3	7
	PC4. foster an environment where others feel respected		10	4	6
	PC5. identify and engage a diverse range of influential contacts		10	4	6
	PC6. obtain guidance from appropriate people, wherever necessary		10	3	7
	PC7. attentively listen to ideas and give constructive feedback		10	3	7
	PC8. promptly resolve conflicts between self or others		10	2	8

Compulsory NOS Total Marks: 700				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC9. work with colleagues to deliver shared goals		10	2	8
	PC10. recognize the contributions made by your colleagues		10	3	7
	Total		**100**	**30**	**70**
7. SSC/N9010 Convince others to take appropriate action in different situations	PC1. gather needs of concerned people	100	10	0	10
	PC2. adapt arguments to consider diverse needs		15	0	15
	PC3. use small wins as milestones to gain support for ideas		25	10	15
	PC4. persuade with the help of concrete examples or evidences		25	10	15
	PC5. take structured actions to reach consensus on the course of action		25	10	15
	Total		**100**	**30**	**70**