CCEK – NSQF ALIGNED PROGRAM

COURSE SYLLABUS

FOR

Internet of Things

CCEK - NATIONAL SKILL DEVELOPMENT TRAINING PROGRAM

Internet of Things

CCEK – NSDC course package covers the following Qualification Packs and leads to the following NSDC certifications. The students who successfully completed the course programs are entitled to get NSDC certification after undergoing the assessment process of NSDC as per the rules and regulations stipulated by NSDC from time to time.

SL. NO.	QUALIFICATIONS PACK	QUALIFICATIONS PACK CODE	NSQF LEVEL
1	**IoT - Test Analyst** **Brief Job Description**: Individuals at this job are responsible for performing various tests across the various layers of the IoT solution. They will be responsible for driving functional tests such as unit, system and acceptance tests and non-functional tests such as load, stress, endurance, scalability and chaos tests for the IoT solution. They will need to have strong analytical thinking and teamwork skills to collaborate with stakeholders and team members for project success.	**SSC/Q8206**	**5**

COURSE DETAILS

Internet of Things

EXAMINATION DETAILS

COURSE NAME	COURSE CODE	ELIGIBILITY	DURATION
Internet of Things	G16	Degree	240

SL. NO.	EXAM	EXAM CODE	MAXIMUM MARK	INTERNAL	TOTAL MARK
THEORY PAPERS					
1	IoT Data Management	T001	100	50	150
2	Emerging Trends in IoT	T002	100	50	150
PRACTICAL PAPERS					
1	IoT System Design and Implementation	L001	100	50	150
2	IoT Security and Privacy Measures	L002	100	50	150
TOTAL MARKS					
1	Total Examination Marks (THEORY Online + PRACTICAL Examination)				400
2	Total Internal Marks				200
3	**Total Marks (Total Internal Marks + Total Examination Marks)**				**600**

Internet of Things

INTERNAL MARK CRITERIA FOR EACH

SL NO.	MODULE	MODULE CODE	MAXIMUM MARK	INTERNAL MARK	TOTAL MARK
1	IoT Data Management	T001	100	50	150
2	Emerging Trends in IoT	T002	100	50	150
3	IoT System Design and Implementation	L001	100	50	150
4	IoT Security and Privacy Measures	L002	100	50	150
	TOTAL		400	200	600

ATTENDANCE	GENERAL PERFORMANCE	INTERNAL EXAMINATIONS/ PROJECTS/ ASSIGNMENTS	TOTAL MARKS
5	5	40	50

COURSE SYLLABUS

FOR

Internet of Things

COURSE	Internet of Things	
TOTAL MARKS	Mark: 600	Internal Mark: 200
TOTAL HOURS	240 Hrs	

DEFENITION OF CREDIT

1 Credit	15Hrs Theory/ 30Hrs Practical
Skill Components	60 – 70 % of Total Credit

MODULES INCLUDED IN THIS SUBJECT

SL NO	MODULE NAME	CREDIT BREAKUP
1	Module 1: Internet of Things - An Introduction	**1**
2	Module 2: IoT Security and Privacy	**1**
3	Module 3: Product Engineering Basics	**1**
4	Module 4: Development Tools and Usage	**0.5**
5	Module 5: End-to-end IoT Testing	**2**
6	Module 6: Functional Testing	
7	Module 7: Non-functional Testing	**1**
8	Module 8: Technical Documentation	
9	Module 9: Inclusive, and Environmentally Sustainable Workplace	**0.5**
10	Module 10: Introduction to Employability Skills	

11	Module 11: Constitutional values - Citizenship	**0.5**
12	Module 12: Becoming a Professional in the 21st Century	
13	Module 13: Basic English Skills	**0.5**
14	Module 14: Career Development and Goal Setting	
15	Module 15: Communication skills	
16	Module 16: Diversity and Inclusion	
17	Module 17: Financial and Digital Literacy	
18	Module 18: Essential Digital Skills	
19	Module 19: Entrepreneurship	
20	Module 20: Customer Service	
	Total	**8**

Training Outcomes

- Discuss the evolution of IoT and its impact on businesses and society.
- List common security and privacy risks that affect IoT solutions and methods that mitigate them.
- Comprehend product engineering concepts such as translating requirements into products and ensuring their timely delivery
- Employ development tools, frameworks, platforms, libraries, and packages to test hardware and software systems.
- Develop test cases, simulations, and automated test scripts to discover defects in IoT solutions.
- Perform functional testing of IoT solutions.
- Perform non-functional testing of IoT solutions.
- Create various types of technical documents.
- Apply the principles of persuasive communication for negotiations and discussions.
- Apply different approaches to build rapport and collaborate with stakeholders.
- Employ best practices to maintain an inclusive and environmentally sustainable workplace.

MODULES

Module 1: Internet of Things - An Introduction

THEORY

- Describe the term “Internet of Things” (IoT).
- Explain the basic concepts underlying the Internet of Things technology.
- Discuss the evolution of IoT and the trends that have led to it.
- List the possible impacts of IoT on businesses and society.
- Check for existing IoT use cases and applications across industries.
- List prospective IoT use cases and applications within your area of expertise.
- List popular analytics services used in analyzing data from IoT devices.

PRACTICAL

- Demonstrate an assembly of autonomous networked devices, their functioning and integration with popular analytics services.
- Demonstrate how to collect, process and analyze data from sample IoT devices.

Module 2: IoT Security and Privacy

THEORY

- Elaborate on the common security and privacy risks that affect IoT solutions.
- List the technologies and methods that mitigate security risks of the IoT solutions.
- Discuss various privacy standards and regulations that mitigate security risks to IoT solutions.
- Explain the social and privacy impacts caused by the proliferation of IoT solutions.

PRACTICAL

- Demonstrate instances of security risks in real-world IoT use cases.

Module 3: Product Engineering Basics

THEORY

- Discuss how to prioritize product ideas based on business requirements.
- Discuss how to categorize the activities performed in various stages of product development.
- Check the ability to execute product plans using the software and tools available at disposable.

PRACTICAL

- Develop plans to ensure the timely delivery of products.
- Develop products with a sustainable competitive advantage.
- Demonstrate how to use product cost models and forecasting methods.

Module 4: Development Tools and Usage

THEORY

- List appropriate tools for building, debugging, testing, tuning, and maintaining programs.
- Elaborate on software development needs and changes.
- Discuss various computing platforms. Prepare sample financial statements of non-corporate entities – (preparation of Manufacturing, Trading, Profit & Loss Account, Income & Expenditure accounts from single- entry system to double entry system)

PRACTICAL

- Employ best practices in coding and documentation.
- Apply scripting languages to automate tasks and write simple programs.
- Demonstrate how to configure operating system components.
- Apply the principles of code and design quality.

Module 5: End-to-end IoT Testing

THEORY

- Evaluate the significance of using simulations to test end-to-end IoT solutions before the development process.
- Evaluate various tests used across IoT solutions such as device, gateway, platform, and integration tests.
- Discuss ways to conduct compatibility and interoperability testing.
- Elaborate on ways of improving device discovery and communication.
- Discuss the regulatory standards and protocols of IoT multidevice.
- Discuss the significance of the various individual units and their interactions within a module as per specifications.
- Describe ways of integrating various units to form a module to perform a definite task.
- Check the interoperability of the units and modules of the IoT solution.
- Discuss the regulatory standards and guidelines of the end-to-end IoT solution.
- List the type of simulation and test data that should be created.

PRACTICAL

- Demonstrate the use of simulations to test end-to-end IoT solutions.

- Demonstrate how to perform an end- to-end security and compliance test.
- Develop test cases for various components of the IoT solution.
- Perform device, functional performance, and user experience testing of the IoT solution.
- Employ ways to manage and follow multidevice and multi-protocol compliance.
- Demonstrate the use of tools to design automated test scripts for test cases at UI, API, and device levels.
- Employ modifications to the design of IoT solutions based on test data.

Module 6: Functional Testing

THEORY

- Discuss the definition and the various types of functional testing.
- Discuss ways to identify test cases and modify them based on the requirements.
- List various test cases which can be automated.
- Elaborate on the type of test data that should be created to address all the requirements of the IoT solution.
- Discuss methods of incorporating iterations into the test cases.
- Describe the role of various stakeholders in verifying, developing, and automating test scripts.
- Discuss ways of collecting the data regarding the usability of the IoT solution from the users.

PRACTICAL

- Demonstrate the use of tools to design automated test scripts for test cases.
- Demonstrate the use of simulations to run test cases to evaluate the outcomes of end- to-end IoT solutions.
- Create a repository of test and simulation cases for relevant stakeholders.
- Demonstrate unit testing to ensure individual codes of the IoT solution work as per specifications.
- Demonstrate System Testing to ensure the integrated IoT solution works as per specifications.
- Demonstrate acceptance testing to ensure the IoT solution follows all the original business criteria.
- Employ modifications to the design of IoT solutions based on the usability feedback from the stakeholders.

Module 7 Non-functional Testing

THEORY

- Discuss the definition and the various types of Non-functional Testing.
- Discuss ways to identify test cases and modify them based on the requirements.
- List various test cases which can be automated.
- Elaborate on the type of test data that should be created to address all the

requirements of the IoT solution.
- Discuss methods of incorporating iterations into the test cases.
- Describe the role of various stakeholders in verifying, developing, and automating test scripts.
- Check if the application design specifications meet the expected workflow of the IoT solution.
- Discuss ways of collecting the data regarding the usability and ease of using the IoT solution from relevant stakeholders

PRACTICAL

- Demonstrate the use of tools to design automated test scripts for test cases.
- Demonstrate the use of simulations to run test cases to evaluate the outcomes of end-to-end IoT solutions.
- Create a repository of test and simulation cases for relevant stakeholders.
- Demonstrate load testing to check if the solution can handle loads as per specifications.
- Demonstrate stress testing to check how the solution will respond beyond its peak load.
- Demonstrate endurance testing to check how the solution will respond to sustained load.
- Demonstrate spike testing to check how the solution will respond to sudden bursts of activity.
- Demonstrate scalability testing to check how the solution will respond to load that is scaled up or down.
- Demonstrate chaos testing to check how the solution will respond to unexpected disruptions.
- Employ modifications to the design based on the usability and ease of using the IoT solution from relevant stakeholders.

Module 8: Technical Documentation

THEORY

- Explain the significance of technical documentation.
- Discuss the importance of various stakeholders in collating relevant data for documentation.
- Describe the needs of the audience for which documentation is to be created.
- Describe popular tools and formats to update the document on a regular basis.

PRACTICAL

- Apply the principles of technical writing.
- Employ methods that ensure documentation is clear and concise.
- Demonstrate how to gather relevant source and create various types of technical documents such as online configuration manuals, user helps, solution information, installation guides, etc.

Module 9: Inclusive, and Environmentally Sustainable Workplace

THEORY

- Describe different approaches for resourceful energy utilisation and waste management.
- Describe the importance of following the diversity policies.
- Discuss the stereotypes and prejudices associated with differently abled people and its negative consequences.
- Discuss the importance of promoting, sharing and implementing gender equality and PwD sensitivity guidelines at organization level.

PRACTICAL

- Employ suitable practices to segregate the recyclable, non-recyclable and hazardous waste generated.
- Demonstrate different methods of energy resource optimization and conservation.
- Demonstrate essential communication methods in line with gender inclusiveness and PwD sensitivity.

Module 10: Introduction to Employability Skills

THEORY

- Discuss the Employability Skills required for jobs in various industries
- List different learning and employability related GOI and private portals and their usage

Module 11: Constitutional values – Citizenship

THEORY

- Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
- Show how to practice different environmentally sustainable practices

Module 12: Becoming a Professional in the 21st Century

THEORY

- Discuss importance of relevant 21st century skills.
- Exhibit 21st century skills like Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.

- Describe the benefits of continuous learning

Module 13: Basic English Skills

THEORY

- Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
- Read and interpret text written in basic English
- Write a short note/paragraph / letter/e -mail using basic English

Module 14: Career Development and Goal Setting

THEORY

- Create a career development plan with well-defined short- and long-term goals

Module 15: Communication skills

THEORY

- Describe the role of digital technology in today's life
- Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
- Explain the importance of active listening for effective communication
- Discuss the significance of working collaboratively with others in a team

Module 16: Diversity and Inclusion

THEORY

- Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
- Discuss the significance of escalating sexual harassment issues as per POSH

Module 17: Financial and Legall Literacy

THEORY

- Discuss various financial institutions, products, and services
- Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deduction
- Discuss the legal rights, laws, and aids
- Demonstrate how to conduct offline and online financial transactions, safely and securely and check passbook/statement
- Calculate income and expenditure for budgeting

Module 18: Essential Digital Skills

THEORY

- Describe the role of digital technology in today's life
- Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
- Discuss the significance of displaying responsible online behaviour while browsing, using various social media platforms, e-mails, etc., safely and securely
- Create sample word documents, excel sheets and presentations using basic features
- utilize virtual collaboration tools to work effectively

Module 19: Entrepreneurship

THEORY

- Explain the types of entrepreneurship and enterprises
- Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
- Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
- Create a sample business plan, for the selected business opportunity

Module 20: Customer Service

THEORY

- Classify different types of customers
- Discuss various tools used to collect customer feedback
- Discuss the significance of maintaining hygiene and dressing appropriately