



# **CCEK – NSQF ALIGNED PROGRAM**

## **COURSE SYLLABUS**

**FOR**

**Web Designing**

# CCEK - NATIONAL SKILL DEVELOPMENT TRAINING PROGRAM

## Web Designing

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	<p><b><u>Embedded Full-Stack IoT Analyst</u></b></p> <p><b>Brief Job Description:</b></p> <p>The individual in this job role creates and implements new embedded OS based on system requirements and/or industry specifications. The individual builds and manages OS drivers for any custom hardware and to enhance existing application with new features.</p>	<b>ELE/Q1404</b>	<b>6</b>

**COURSE DETAILS**

**Web Designing**

**EXAMINATION DETAILS**

COURSE NAME	COURSE CODE	ELIGIBILITY	DURATION
Web Designing	G20	Diploma OR 12th	280

SL. NO.	EXAM	EXAM CODE	MAXIMUM MARK	INTERNAL	TOTAL MARK
<b>THEORY PAPERS</b>					
1	Fundamentals of Web Technologies & Server-side Scripting and Databases	T001	100	50	150
2	IoT & Embedded Web Integration	T002	100	50	150
<b>PRACTICAL PAPERS</b>					
1	IoT-Based Web Application Integration	L001	100	50	150
<b>TOTAL MARKS</b>					
1	Total Examination Marks (Theory Online + Practical Examination)				300
2	Total Internal Marks				150
3	<b>Total Marks (Total Internal Marks + Total Examination Marks )</b>				<b>450</b>

**Web Designing**

**INTERNAL MARK CRITERIA FOR EACH**

SL NO.	MODULE	MODULE CODE	MAXIMUM MARK	INTERNAL MARK	TOTAL MARK
1	Fundamentals of Web Technologies & Server-side Scripting and Databases	T001	100	50	150
2	IoT & Embedded Web Integration	T002	100	50	150
3	IoT-Based Web Application Integration	L001	100	50	150
	TOTAL		300	150	450

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

# **COURSE SYLLABUS**

**FOR**

**Web Designing**

<b>COURSE</b>	Web Designing	
<b>TOTAL MARKS</b>	Mark: 450	Internal Mark: 150
<b>TOTAL HOURS</b>	280 Hrs	

**DEFENITION OF CREDIT**

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

**MODULES INCLUDED IN THIS SUBJECT**

<b>SL NO</b>	<b>MODULE NAME</b>	<b>CREDIT BREAKUP</b>
1	Module 1: Introduction and orientation to the role of an Embedded Full-Stack IoT Analyst	<b>1</b>
2	Module 2: Process of developing and testing design forIoT Based System	<b>1</b>
3	Module 3: Process of Building GUI and Applicationsin a Framework	<b>2</b>
4	Module 4: Process of testing and troubleshooting the firmware	<b>1</b>
5	Module 5: Apply health and Safety Practices at Workplace	<b>1</b>
6	Module 6: Employability Skills	<b>1</b>
7	Module 7: On-the-Job Training	<b>2</b>
	Total	<b>9</b>

## **Training Outcomes**

- Describe the process of developing and testing design for IoT based system.
- Demonstrate the process of building GUI and applications in a framework.
- Demonstrate the process testing and troubleshooting the firmware.
- Explain the importance of working effectively at the workplace.
- Demonstrate various practices to be followed to maintain health and safety at work.

## MODULES

### **Module 1: Introduction and orientation to the role of an Embedded FullStack IoT Analyst**

#### **THEORY**

- Describe the size and scope of the electronics industry and its subsectors.
- Discuss the role and responsibilities of an Embedded Full-Stack IoT Analyst.
- Describe various employment opportunities for an Embedded FullStack IoT Analyst.

#### **PRACTICAL**

- Familiarization with the embedded system
- Understanding of IoT

### **Module 2: Process of developing and testing design for IoT Based System**

#### **THEORY**

- Distinguish Identify the high-level design and connectivity requirements for meeting the system needs
- Explain the importance of using appropriate techniques to assess software and firmware requirements and carry out feasibility analysis of the proposed embedded product design and evaluate required parameters.
- Identify the protocols that facilitate the handshakes between different connected devices in the IoT system
- Identify embedded OS, development machines, tools and language for developing a new product
- Identify the modifications required to an existing microprocessor/microcontroller software
- Identify continuous integration / continuous development platform requirements and automation test case requirements and functional specifications of each components and as a system
- Identify the steps to maintain IP confidentiality rights and protect intellectual property from unauthorised use
- Identify the feasible solutions which will work within the constraints and meet the overall cost objective

#### **PRACTICAL**

- Prepare a requirement specification document by analysing the needs of all the stakeholders
- Prepare the M2M information in a flow chart or a connected diagram depicting inputs and the outputs of the system
- Apply safety and security aspects required in all the stages of the design

- Assess the technical specifications and requirement for coding and licensed software as per globally accepted regulatory standards
- Prepare different design specifications, including High Level Design (HLD) and Low level Design
- Prepare a summary of the requirement specifications along with the variables to be recorded, need for specific connectivity at each interface, etc.
- Develop device drivers for various components (sensors, timers, data communication ports, analog-to-digital and digital-to-analog converters) and peripherals
- Analyse and record the test results to plan corrective action.
- Use software debugging tools; emulators, debuggers, etc., design constraints and complete design cycle from understanding customer's specifications to production
- Use syntax and semantics of the C language for embedded programming and understanding of basic tools of editor, compiler and configuration management
- Use different types of tools, hardware and software and testing devices and approved techniques to check defects/malfunctions
- Develop applications to perform signal processing, data acquisition, event processing, and data management and communication functions and systems using real-time embedded OS (VxWorks, QNX, etc.)
- Use correct syntax when developing code
- Execute unit-test cases (UTCs) by white box testing method
- Develop embedded systems with embedded operating systems
- Prepare design of IoT system after discussion with experts with respect to possible overall IoT system(s) solution, the technical evaluation criteria and appropriate components to be deployed
- Use the reusable components, relevant best practices and design standards from the organization's knowledge base
- Prepare the work plan with deliverables and time line
- Develop strategies for energy efficiency, environmental standards and safety measures
- Perform testing and debugging of the assembled system and report problems into a bug tracking system

### **Module 3: Process of Building GUI and Applications in a Framework**

#### **THEORY**

- Identify the style of interface
- Identify the steps to validate the design and interface
- Use right syntax, lightweight framework, responsive design, event handling methods, interactivity etc in GUI designing
- Develop python-based application for communication and interfacing between devices and cloud server using various application protocols
- Monitor the performance metrics of the application

## **PRACTICAL**

- Prepare timeliness of activities and strategy for efficient programming based on software requirement specification
- Use the appropriate development kit, programming and software based on requirements
- Perform IoT application development after selecting the right platform
- Create user flow diagram, design map for the interface, wireframe, mock up, prototype
- Demonstrate the steps such as identification, selection, installation and troubleshooting of different modules/devices for real applications for Smart cities, healthcare etc.
- Use proper GUI programming language to develop a good UI design for the application
- Comply with security aspects for IoT applications

## **Module 4: Process of testing and troubleshooting the firmware**

### **THEORY**

- Apply key features of the programming language to test the solutions such as use of registers, addressing modes, assembler instructions, subroutines and flags, etc.
- Use debugging techniques to rectify and compile the code
- Check for functional correctness after loading the code into embedded software and testing and debugging the same using tools such as JTAG, GDB etc
- Identify and debug malfunctions in the constructed prototype devices/components using appropriate software, hardware and testing methods
- Analyse failure to develop corrective action
- Identify how to configure the system in different combination to be used by various applications

### **PRACTICAL**

- Develop testing procedure to analyse code and to determine root cause of problems
- Demonstrate interoperability testing with other elements in the IoT framework
- Develop and automate test plans and bug tracking system
- Resolve problems and fix the problem as per standard operating procedure
- Retest the prototype and document the new product design
- Interpret the test results and specifications for compliance
- Conduct root cause analysis in case problem still exists to debug and rectify the issue

## Module 5: Apply work and health safety practices

### THEORY

- Identify Discuss job-site hazards, risks and accidents.
- Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials.
- Elaborate the electronic waste disposal procedures.
- Describe the process of disposal of hazardous waste
- List the name and location of concerned people, documents and equipment for maintaining health and safety in the workplace.
- Describe how to interpret warning signs while accessing sensitive work areas.
- Explain the importance of good housekeeping.
- Describe the importance of maintaining appropriate postures while lifting heavy objects.
- List the types of fire and fire extinguishers.
- Explain the importance of efficient utilisation of water, electricity and other resources.
- List the common sources of pollution and ways to minimize it.
- Describe the concept of waste management and methods of disposing hazardous waste.
- Explain various warning and safety signs.
- Describe different ways of preventing accidents at the workplace.

### PRACTICAL

- Demonstrate the use of protective equipment suitable as per tasks and work conditions.
- Report any abnormal situation/behavior of any equipment/system to the relevant authorities.
- Administer first aid in case of a minor accident.
- Demonstrate the steps to free a person from electrocution safely.
- Administer Cardiopulmonary Resuscitation (CPR).
- Demonstrate the application of defined emergency procedures such as raising alarm, safe/efficient, evacuation, moving injured people, etc.
- Prepare a sample incident report.
- Use a fire extinguisher in case of a fire incident.
- Demonstrate the correct method of lifting and handling heavy objects.

## Module 6: Employability Skills

### THEORY

- Differentiate Explain constitutional values, civic rights, responsibility towards society to become a responsible citizen
- Discuss 21st century skills
- Explain use of basic English phrases and sentences.
- Demonstrate how to communicate in a well-behaved manner

- Demonstrate how to work with others
- Demonstrate how to operate digital devices
- Discuss the significance of Internet and Computer/ Laptops
- Discuss the need for identifying business opportunities
- Discuss about types of customers.
- Discuss on creation of bio-data
- Discuss about apprenticeship and opportunities related to it

### **PRACTICAL**

- List different learning and employability related GOI and private portals and their usage
- Show how to practice different environmentally sustainable practices.
- Exhibit 21st century skills like Self Awareness, Behavior Skills, time management, etc.
- Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
- Demonstrate how to communicate in a well -mannered way with others.
- Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette
- Utilize virtual collaboration tools to work effectively
- Demonstrate how to maintain hygiene and dressing appropriately.
- Perform a mock interview

## **Module 7: On-the-Job Training**

### **THEORY**

- Identify Explain the protocols that facilitate the handshakes between different connected devices in the IoT system.
- Prepare the M2M information in a flow chart or a connected diagram depicting inputs and the outputs of the system.
- Prepare design of IoT system after discussion with experts with respect to possible overall IoT system(s) solution, the technical evaluation criteria and appropriate components to be deployed.
- Perform testing and debugging of the assembled system and report problems into a bug tracking system.
- Create user flow diagram, design map for the interface, wireframe, mock up, prototype.
- Use proper GUI programming language to develop a good UI design for the application.
- Develop and automate test plans and bug tracking system.
- Conduct root cause analysis in case problem still exists to debug and rectify the issue.
- Perform assigned work within the turnaround time and as per the defined quality standards.
- Demonstrate how to maintain a healthy, safe and secure working environment.