



# Essential Fundamentals of IoT

QP Code: ELE/N1417

Version: 1.0

NSQF Level: 4

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## Qualification Pack

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## Qualification Pack

### ELE/N1417: Essential Fundamentals of IoT

#### Brief Job Description

The "Essential Fundamentals of IoT" is a comprehensive training course designed for students, covering fundamental concepts, architectures, hardware platforms, connectivity protocols, security considerations, and future trends in the Internet of Things (IoT). This program equips students with essential skills and knowledge to excel in the evolving IoT landscape.

#### Personal Attributes

undefined

#### Applicable National Occupational Standards (NOS)

##### Compulsory NOS:

1. [ELE/N1417: Essential Fundamentals of IoT](#)

#### Qualification Pack (QP) Parameters

<b>Sector</b>	Electronics
<b>Sub-Sector</b>	
<b>Occupation</b>	Product Design-S&C
<b>Country</b>	
<b>NSQF Level</b>	4
<b>Credits</b>	2
<b>Aligned to NCO/ISCO/ISIC Code</b>	
<b>Minimum Educational Qualification &amp; Experience</b>	12th Class (or Equivalent (Science Stream)) OR 10th Class (with 2 years ITI in the relevant area)
<b>Minimum Level of Education for Training in School</b>	
<b>Pre-Requisite License or Training</b>	NA



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<b>Minimum Job Entry Age</b>	Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	30/04/2027
<b>NSQC Approval Date</b>	06/06/2024
<b>Version</b>	1.0
<b>Reference code on NQR</b>	NG-04-EH-02529-2024-V1-ESSC
<b>NQR Version</b>	1



## Qualification Pack

### ELE/N1417: Essential Fundamentals of IoT

#### Description

The "Essential Fundamentals of IoT" is a comprehensive training course designed for students, covering fundamental concepts, architectures, hardware platforms, connectivity protocols, security considerations, and future trends in the Internet of Things (IoT). This program equips students with essential skills and knowledge to excel in the evolving IoT landscape.

#### Scope

The scope covers the following :

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- Understanding IoT concepts and architectures
- Exploring various connectivity protocols and wireless technologies
- Hands-on experience with embedded systems and hardware platforms
- Addressing security challenges and emerging trends like AI/ML integration and edge computing

#### Elements and Performance Criteria

##### *Understanding IoT Concepts and Technologies*

To be competent, the user/individual on the job must be able to:

- PC1.** Basics of IoT: Understand the core concepts and elements of the Internet of Things.
- PC2.** Evolution of IoT: Learn how IoT technology has developed over time and its impact.
- PC3.** Key Technologies: Explore essential technologies like sensors, connectivity, and data analytics driving IoT.
- PC4.** Challenges: Identify common challenges in implementing IoT, such as security and scalability.
- PC5.** Opportunities and Risks: Assess the potential benefits and risks associated with widespread adoption of IoT.

##### *Building IoT Systems*

To be competent, the user/individual on the job must be able to:

- PC6.** Architectural Considerations: Understand the fundamental principles behind designing IoT architectures. (Powered by ARM Processor)
- PC7.** Computing Paradigms: Differentiate between cloud, fog, and edge computing and their roles in IoT.
- PC8.** Gateways: Learn about the importance of gateways in facilitating communication within IoT systems.
- PC9.** Architecture Selection: Choose suitable architectures based on specific application needs and requirements. (Powered by ARM Processor)
- PC10.** Standardization Efforts: Explore ongoing efforts to establish standards for interoperability and security in IoT.

##### *Implementation and Security*

To be competent, the user/individual on the job must be able to:



## Qualification Pack

- PC11.** Embedded Systems: Define embedded systems and their components, crucial for IoT device design. (Powered by ARM Processor)
- PC12.** Hardware Platforms: Compare options for building embedded systems, considering factors like cost and performance. (Powered by ARM Processor)
- PC13.** Connectivity: Learn about wireless protocols like Bluetooth, ZigBee and Wi-Fi (IEEE 802.11) used for IoT communication.
- PC14.** Security Measures: Understand security mechanisms such as encryption and authentication to safeguard IoT data.
- PC15.** Future Trends: Explore emerging trends like AI integration and edge computing shaping the future of IoT technology. (Powered by ARM Processor)

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** Core IoT Concepts: Essential principles and components for understanding IoT technology.
- KU2.** IoT Evolution: Historical development and transformative trends shaping IoT.
- KU3.** Enabling Technologies: Sensors, connectivity solutions crucial for driving IoT deployment.
- KU4.** Implementation Challenges: Security, scalability issues common in IoT system implementation.
- KU5.** Architectural Principles: Principles guiding scalable, interoperable architecture design in IoT.
- KU6.** Computing Paradigms: Differentiating cloud, fog, edge computing, roles in IoT.
- KU7.** Gateway Functionality: Pivotal role of gateways in facilitating communication, data processing.
- KU8.** Architecture Selection: Choosing suitable architectures based on application needs, requirements.
- KU9.** Standardization Efforts: Initiatives for establishing standards ensuring IoT interoperability, security.
- KU10.** Embedded Systems & Hardware Platforms: Components, options for IoT hardware design.

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** Communication: Effectively convey technical concepts to diverse audiences in the IoT domain
- GS2.** Collaboration: Work efficiently in interdisciplinary teams to tackle complex IoT projects.
- GS3.** Problem-Solving: Analyze and address challenges encountered in IoT system design and implementation.
- GS4.** Adaptability: Flexibly navigate evolving IoT technologies and methodologies.
- GS5.** Creativity: Innovate solutions to real-world IoT challenges with novel approaches.
- GS6.** Time Management: Efficiently manage project timelines and deliverables in IoT implementations.
- GS7.** Digital Literacy: Proficiency in utilizing IoT development tools and platforms.



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**GS8.** Ethical Awareness: Adhere to industry standards and best practices in IoT development and deployment.

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### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Understanding IoT Concepts and Technologies</i>	<b>20</b>	-	-	-
<b>PC1.</b> Basics of IoT: Understand the core concepts and elements of the Internet of Things.	4	-	-	-
<b>PC2.</b> Evolution of IoT: Learn how IoT technology has developed over time and its impact.	4	-	-	-
<b>PC3.</b> Key Technologies: Explore essential technologies like sensors, connectivity, and data analytics driving IoT.	4	-	-	-
<b>PC4.</b> Challenges: Identify common challenges in implementing IoT, such as security and scalability.	4	-	-	-
<b>PC5.</b> Opportunities and Risks: Assess the potential benefits and risks associated with widespread adoption of IoT.	4	-	-	-
<i>Building IoT Systems</i>	<b>20</b>	<b>20</b>	-	-
<b>PC6.</b> Architectural Considerations: Understand the fundamental principles behind designing IoT architectures. (Powered by ARM Processor)	4	4	-	-
<b>PC7.</b> Computing Paradigms: Differentiate between cloud, fog, and edge computing and their roles in IoT.	4	4	-	-
<b>PC8.</b> Gateways: Learn about the importance of gateways in facilitating communication within IoT systems.	4	4	-	-
<b>PC9.</b> Architecture Selection: Choose suitable architectures based on specific application needs and requirements. (Powered by ARM Processor)	4	4	-	-
<b>PC10.</b> Standardization Efforts: Explore ongoing efforts to establish standards for interoperability and security in IoT.	4	4	-	-
<i>Implementation and Security</i>	<b>20</b>	<b>20</b>	-	-



### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC11.</b> Embedded Systems: Define embedded systems and their components, crucial for IoT device design. (Powered by ARM Processor)	4	4	-	-
<b>PC12.</b> Hardware Platforms: Compare options for building embedded systems, considering factors like cost and performance. (Powered by ARM Processor)	4	4	-	-
<b>PC13.</b> Connectivity: Learn about wireless protocols like Bluetooth, ZigBee and Wi-Fi (IEEE 802.11) used for IoT communication.	4	4	-	-
<b>PC14.</b> Security Measures: Understand security mechanisms such as encryption and authentication to safeguard IoT data.	4	4	-	-
<b>PC15.</b> Future Trends: Explore emerging trends like AI integration and edge computing shaping the future of IoT technology. (Powered by ARM Processor)	4	4	-	-
<b>NOS Total</b>	<b>60</b>	<b>40</b>	-	-



## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ELE/N1417
<b>NOS Name</b>	Essential Fundamentals of IoT
<b>Sector</b>	Electronics
<b>Sub-Sector</b>	
<b>Occupation</b>	Product Design-S&C
<b>NSQF Level</b>	4
<b>Credits</b>	2
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	30/04/2024
<b>Next Review Date</b>	30/04/2027
<b>NSQC Clearance Date</b>	30/04/2024

## Assessment Guidelines and Assessment Weightage

### Assessment Guidelines

Guidelines are same as mentioned in the Qualification File.

#### Minimum Aggregate Passing % at QP Level : 70

**(Please note:** Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

### Assessment Weightage

Compulsory NOS



### Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ELE/N1417.Essential Fundamentals of IoT	60	40	-	-	100	100
<b>Total</b>	<b>60</b>	<b>40</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>



## Qualification Pack

### Acronyms

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training

## Qualification Pack

### Glossary

<b>Sector</b>	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
<b>Scope</b>	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

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<b>Knowledge and Understanding (KU)</b>	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
<b>Organisational Context</b>	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
<b>Technical Knowledge</b>	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
<b>Core Skills/ Generic Skills (GS)</b>	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
<b>Electives</b>	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
<b>Options</b>	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.