











Model Curriculum

QP Name: 7D BIM Creator - BIM & IoT Integration

QP Code: CON/Q2104

Version: 1.0

NSQF Level: 6.0

Model Curriculum Version: 1.0

Construction Skill Development Council of India | | Tower 4B, DLF Corporate Park, 201&, 202 4B, Mehrauli-Gurgaon Rd, DLF Phase 3, Gurugram, Haryana 122002











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Training Parameters

Sector	Construction
Sub-Sector	Real Estate and Infrastructure Construction
Occupation	Building Information Modeling (BIM)
Country	India
NSQF Level	6.0
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2142.9900
Minimum Educational Qualification and Experience	Pursuing first year of 2-year PG program after completing 3-year UG degree OR Completed 4-year UG (in case of 4-year UG with honours/honours with research) OR Completed 3-Year UG Degree with 1-year relevant experience OR Completed 2 year of diploma after 12th with 2-year relevant experience OR Previous relevant Qualification of NSQF Level 5.5 with 1.5-year relevant experience OR Previous relevant Qualification of NSQF Level 5 with 3-year relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	21 Years
Last Reviewed On	31/08/2023
Next Review Date	31/08/2026
NSQC Approval Date	31/08/2023
QP Version	1.0











Model Curriculum Creation Date	31/08/2023
Model Curriculum Valid Up to Date	31/08/2026
Model Curriculum Version	1.0
Minimum Duration of the Course	600 Hours
Maximum Duration of the Course	600 Hours











Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills to:

- Describe the process of integrating IoT with 7D BIM operations.
- Describe the process of performing facility and asset management using 7D BIM.
- Elucidate ways to manage workplace for safe and healthy work environment.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
CON/N2108: Integrate IoT with 7D BIM operations NOS Version- 1.0 NSQF Level- 6.0	55:00	95:00	90:00	00:00	240:00
Module 1: Introduction to the role of a 7D BIM Creator - BIM & IoT Integration	05:00	0:00	0:00	00:00	05:00
Module 2: Process of integrating IoT with 7D BIM operations	50:00	95:00	90:00	00:00	235:00
CON/N2109: Perform facility and asset management using 7D BIM NOS Version- 1.0 NSQF Level- 6.0	80:00	100:00	60:00	00:00	240:00
Module 3: Process of performing facility and asset management using 7D BIM	80:00	100:00	60:00	00:00	240:00
CON/N9003: Manage health and safety at the workplace NOS Version No. 1.0 NSQF Level -5	15:00	15:00	0:00	00:00	30:00
Module 4: Managing Health and Safety at the Workplace	15:00	15:00	0:00	00:00	30:00











DGT/VSQ/N0103: Employability Skills NOS Version- 1.0 NSQF Level- 5	90:00	00:00	0:00	00:00	90:00
Module 5: Employability Skills	90:00	00:00	0:00	00:00	90:00
Total Duration	240:00	210:00	150:00	00:00	600:00











Module Details

Module 1: Introduction to the role of a 7D BIM Creator - BIM & IoT **Integration**

Mapped to CON/N2108, v1.0

Terminal Outcomes:

• Discuss the job role of a 7D BIM Creator - BIM & IoT Integration.

Duration: 05:00	Duration: 0:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
 Describe the size and scope of the construction industry and its sub- sectors. 	
 Discuss the role and responsibilities of a 7D BIM Creator - BIM & IoT Integration. 	
 Identify various employment opportunities for a 7D BIM Creator - BIM & IoT Integration. 	
Classroom Aids	
Training Kit - Trainer Guide, Presentations, White	board, Marker, Projector, Laptop, Video Films
Tools, Equipment and Other Requirements	
NA	







Duration: 95:00





Module 2: Process of Integrating IoT with 7D BIM Operations Mapped to CON/N2108, v1.0

Terminal Outcomes:

Duration: 50:00

- Describe the process of setting up IoT sensors and devices.
- Elucidate ways to capture and analyze data.

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
 Explain BIM and how they apply to the design and construction industry. Explain the objectives of 7D BIM - operations and facility management 	 Demonstrate the process of performing the appropriate testing to ensure the correct functioning of IoT- based sensors and devices.
,	ensure the correct functioning of IoT-
	store and utilize the large-scale data generated by IoT devices, with the increased data security and ease of accessing it. • Demonstrate how to analyze the data captured by IoT-based sensors and devices and take appropriate
3 7D BIM Creator - BIM & IoT Integration	decisions concerning facility management.











Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Revit, AutoCAD, Navisworks, Desktop











Module 3: Process of Performing Facility and Asset Management using **7D BIM**

Mapped to CON/N2109, v1.0

Terminal Outcomes:

- Elucidate ways to monitor and manage the facility and assets.
- Describe the process of performing post-occupancy evaluations.
- Explain the process of performing space and safety management.
- Elucidate ways to support in retrofitting and renovations.
- Describe the process of carrying out reporting.

Duration: 80:00	Duration: 100:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
 Describe Asset Information Modeling (AIM) and Project Information Modeling (PIM). State Organizational Information Requirements (OIR), Asset Information Requirements (AIR) and Exchange Information Requirements (EIR). 	 Demonstrate how to create a dynamic model of the facility using BIM to be utilized throughout the facility's lifecycle. Demonstrate how to conduct Post-Occupancy Evaluations (POE) to evaluate the built environment of the facility.
 Explain the planning and management of maintenance operations throughout a building's lifecycle. 	 Demonstrate the use of Augmented Reality (AR) while conducting POE to get an accurate impression of resident interventions to assist in the adjustment of future developments.
 Discuss the lifecycle BIM strategies. 	Demonstrate the use of BIM data for
 Explain the BIM embedded Operations and Maintenance (O&M) manuals. 	 conducting feasibility studies. Show how to develop context-
 Explain the Construction Operations Building Information Exchange 	specific and relational data by processing the collected data.
(COBie) data population and extraction.	Show how to export BIM data to external databases for use with the
• Explain the BIM maintenance plans.	relevant asset management systems.
 Describe the Level of Development (LOD) 400 and 500. 	 Demonstrate how to create reports of metadata of the building model to assist with facilities management.
 Explain how to create and manage metadata for building elements. 	 Demonstrate the process of using the reporting dashboard to collect the
 Describe the methods of creation, evaluation, and exchange of BIM. 	relevant data and prepare reports.
 Elucidate how to leverage BIM and 7D modeling for construction 	











optimization and sustainable building initiatives.

- Describe Programming Using a spatial program to efficiently and accurately assess a design's performance and effectiveness relative to the spatial requirements.
- Describe record modeling creating an accurate depiction of the physical conditions, environment, and assets of a facility.
- State preventative maintenance scheduling - tracking and maintaining lifecycle information about the building structure as well as the equipment, planning and scheduling a program of maintenance activities that will improve building performance, reduce repairs, and reduce overall maintenance costs.
- Describe asset management linking data in a BIM record model to a database of building assets to assist in efficiently maintaining and operating the facility.
- Describe space management and tracking - allocating, managing, and tracking spaces and related resources within a facility.
- Explain the collaborative use of BIM information in making design and construction decisions, with a facilities/operations management framework.

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Revit, AutoCAD, Navisworks, Desktop











Module 4: Managing Health and Safety at the Workplace Mapped to CON/N9003, v1.0

Terminal Outcomes:

- Explain the importance of ensuring health and safety at the workplace.
- Discuss how to manage workplace emergencies.
- Demonstrate the use of Personal Protective Equipment (PPE).

Duration: 15:00	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
 Explain the importance of health and safety at work. 	Demonstrate how to use the appropriate PPE according to the nature of work.
 Discuss the regulations relevant to health and safety at work. 	Demonstrate the use of relevant emergency equipment, e.g. use of fire
 Explain the selection of appropriate PPE according to the nature of work. 	extinguishers to extinguish different types of fire.
 Discuss the importance of regular cleaning and sanitization at work. 	Demonstrate how to provide first aid for different types of injuries or modical emergencies.
 Explain the importance of regular workplace safety audits. 	medical emergencies.
 Discuss the common health and safety hazards at the workplace and the appropriate preventive measures. 	
 Discuss the benefits of providing comprehensive training to personnel on emergency procedures. 	
 Explain the importance of the availability of an updated first-aid kit and functioning emergency equipment at work. 	
 Discuss the appropriate measures to be taken during different workplace emergencies. 	
 Explain the documentation and reporting requirements concerning workplace emergencies. 	

Classroom Aids:

Training Kit - Trainer Guide, Projector/LED Monitor, Computer/ Laptop, Presentations, Black/ Whiteboard, Marker, Projector, Video

Tools, Equipment, and Other Requirements











Safety Gloves, Face Mask, Soap/ Hand Sanitizer, Safety goggles, Fire Extinguishers, Sand buckets, Fire prevention kit, First Aid box, Safety Tags, Safety Notice Board











Module 5: Employability Skills Mapped to DGT/VSQ/N0103, v1.0

Duration: 90:00

Key Learning Outcomes

Introduction to Employability Skills Duration: 3 Hours

After completing this programme, participants will be able to:

- Outline the importance of Employability Skills for the current job market and future of work
- 2. List different learning and employability related GOI and private portals and their usage
- 3. Research and prepare a note on different industries, trends, required skills and the available opportunities

Constitutional values – Citizenship Duration: 1.5 Hours

- 4. 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
- 5. Demonstrate how to practice different environmentally sustainable practices

Becoming a Professional in the 21st Century Duration: 5 Hours

- 6. Discuss relevant 21st century skills required for employment
- 7. Highlight the importance of practicing 21st century skills like Self-Awareness, Behavior 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
- 8. Create a pathway for adopting a continuous learning mindset for personal and professional development

Basic English Skills Duration: 10 Hours

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

Career Development & Goal Setting Duration: 4 Hours

- 12. Create a career development plan
- 13. Identify well-defined short- and long-term goals

Communication Skills Duration: 10 Hours

- 14. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette
- 15. Write a brief note/paragraph on a familiar topic











- 16. Explain the importance of communication etiquette including active listening for effective communication
- 17. Role play a situation on how to work collaboratively with others in a team

Diversity and Inclusion Duration: 2.5 Hours

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

Financial and Legal Literacy Duration: 10 Hours

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

Essential Digital Skills Duration: 20 Hours

- 25. Describe the role of digital technology in day-to-day life and the workplace
- 26. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
- 27. Demonstrate how to connect devices securely to internet using different means
- 28. Follow the dos and don'ts of cyber security to protect against cyber crimes
- 29. Discuss the significance of displaying responsible online behavior while using various social media platforms
- 30. Create an e-mail id and follow e- mail etiquette to exchange e -mails
- 31. Show how to create documents, spreadsheets and presentations using appropriate applications
- 32. utilize virtual collaboration tools to work effectively

Entrepreneurship Duration: 7 Hours

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

Customer Service Duration: 9 Hours

- 37. Classify different types of customers
- 38. Demonstrate how to identify customer needs and respond to them in a professional manner
- 39. Discuss various tools used to collect customer feedback
- 40. Discuss the significance of maintaining hygiene and dressing appropriately











Getting ready for apprenticeship & Jobs Duration: 8 Hours

- 41. Draft a professional Curriculum Vitae (CV)
- 42. Use various offline and online job search sources to find and apply for jobs
- 43. Discuss the significance of maintaining hygiene and dressing appropriately for an interview
- 44. Role play a mock interview
- 45. List the steps for searching and registering for apprenticeship opportunities











Module 6: On-the-Job Training

Mapped to 7D BIM Creator - BIM & IoT Integration

Mandatory Duration: 150:00 Recommended Duration: 00:00

Location: On-Site

Terminal Outcomes

- Explain BIM and how they apply to the design and construction industry.
- Explain the importance of using a scalable and configurable BIM management system.
- Integrate the IoT-based monitoring system with 7D BIM for efficient and real-time monitoring of the facility, e.g. events and physical changes.
- Use the appropriate IoT-based solutions to reduce the maintenance and energy costs in the facility, e.g. smart lighting system.
- Use cloud computing to store and utilize the large-scale data generated by IoT devices, with the increased data security and ease of accessing it.
- Create and implement the appropriate BIM IoT workflow, utilizing web-connected devices to supervise and control data exchanges directly from the digital BIM model.
- Use fire protection equipment for a different types of fire hazards.











Annexure

Trainer Requirements

Trainer Prerequisites								
Minimum Educational	•		ant Industry ience	ry Training Experience		Training Experience		Remarks
Qualification		Years	Specialization	Years	Specialization			
ITI/12th	Any domain	13	Building information modelling (BIM)	0	-			
Diploma in Engineering	Civil Engineering/ Mechanical Engineering/ Manufacturing/ Mathematics/ Physics degree	10	Building information modelling (BIM)	0	-			
Graduate	Civil Engineering/ Mechanical Engineering	8	Building information modelling (BIM)	0	-			

Trainer Certification				
Domain Certification	Platform Certification			
Certified for Job Role "7D BIM Creator - BIM & IoT Integration", mapped to QP: "CON/Q2104, v1.0", Minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: "Trainer (Vet and Skills)", mapped to the Qualification Pack: "MEP/Q2601, v2.0". The minimum accepted score as per MEPSC guidelines is 80%.			











Assessor Requirements

Assessor Prerequisites						
Minimum Educational	operanzation.		Relevant Industry Experience		Training/Assessment Experience	
Qualification		Years	Specialization	Years	Specialization	
ITI/12th	Any domain	13	Building information modelling (BIM)	0	-	
Diploma in Engineering	Civil Engineering/ Mechanical Engineering/ Manufacturing/ Mathematics/ Physics degree	10	Building information modelling (BIM)	0	-	
Graduate	Civil Engineering/ Mechanical Engineering	8	Building information modelling (BIM)	0	-	

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role "7D BIM Creator - BIM & IoT Integration", mapped to QP: "CON/Q2104, v1.0", Minimum accepted score is 80%	Certified for the Job Role: "Assessor (Vet and Skills)", mapped to the Qualification Pack: "MEP/Q2701, v2.0", with a minimum score of 80%.











Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

1. Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SIP
- The batch allocation Matrix prepared for each month based on previous months' performance of AAs, which determines the quantum of Assessment which can be allocated to each AA for a month
- Post allocation of assessment, Assessment agencies send the assessment confirmation to SSC
- Assessment agency deploys the ToA certified Assessor for executing the assessment
- SSC monitors the assessment process.

2. Testing Environment:

- A combination of Theory and practical/demonstration test is deployed to assess knowledge and Skill respectively of Learners.
- Assessment is conducted at Training center in in-person/offline mode
- For Skill assessment, environment is simulated to create a realistic Working Environment that should replicate the key features of the workplace. In job roles, where it is difficult to replicate the same, the OJT assessment is implemented.
- During the practical task, trainees are assessed on their workmanship, quality of finished product, time management, etc., based on the performance criteria (PC), knowledge and understanding and their professional and soft skills as specified in the qualification pack.
- Knowledge assessment is done through closed ended questions up to level 4 and from level
 5 onwards, it is mixture of open ended and closed ended questions

3. Assessment Quality Assurance levels/Framework

- Assessment criteria is developed for each QP which acts as a guide for developing question set /banks
- Sample questions aligned with Assessment criteria for each QP are developed by SSC and validated by industry
- Taking reference of Assessment criteria and Sample Questions, AAs create the question bank which is further validated by SSC
- Questions are mapped to the specified assessment criteria
- It is mandatory that Assessor and Trainer must be ToA certified & ToT Certified respectively
- Continuous Monitoring through virtual and In-person mode are conducted to ensure the assessment is conducted as per stipulated process
- Process and Technical audit of assessment batches by quality team are conducted to avoid the errors in assessment process











- A well-defined comprehensive framework of NON-COMPLIANCE MATRIX is defined and implemented to identify the non-compliance made by assessor and AA and punitive actions are taken correspondingly.
- The capacity building sessions are conducted regularly for assessors and assessment agencies to update them about best practices in assessment

4. Types of evidence or evidence-gathering protocol:

- Post Assessment, the evidences are uploaded by Assessor to assessment agency and further assessment agency to SSC as per stipulated TAT
- Evidences are broadly the photographic and video graphic in nature
- Assessment agencies upload the evidence on SIP and detailed evidence on SSC digital platform (ZoHO)
- Evidences are; NOS wise-Geotagged photographs and videos of Theory Test & Practical Tasks, Attendance sheet, result summary sheet, group photographs.

5. Method of verification or validation:

- The process and technical audit of assessment batches are done by SSC
- Attendance of each candidate is verified and it is ensured that only those candidates are assessed by assessors who are meeting the stipulated minimum percentage of attendance
- The result of each candidate is verified, it is verified that that result on SIP are matching with respect to summary sheet submitted by AAs
- Under detailed technical audit for sample of batches, the knowledge and skill assessment results for each candidate is checked in technical aspect.
- All the evidences of batches are preserved on server of SSC digital platform

On the Job:

 On job training (OJT), candidates undergo training and leaning at actual workplace for a fixed period of time and a certain weightage of assessment is allocated out of total skill weightage of Qualification Pack for undergoing OJT as stipulated by CSDCI. This OJT score and assessors' end point score are combined to arrive at final Marking/grading of trainees' skill test. The OJT score is determined by Supervisor of company under which candidates undergo on job training.











Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
CSDCI	Construction Skill development Council of India
MCQ	Multiple Choice Question
EHS	Environment Health and Safety