



**National Competency Standards Level-5 for “Mobile App, Web & Game Development”**



**National Competency Standards Level-5 for Mobile App, Web & Game Development  
“Full Stack Developer”**



**National Vocational and Technical Training Commission (NAVTTC),  
Government of Pakistan**



**National Competency Standards Level-5 for “Mobile App, Web & Game Development”**



**ACKNOWLEDGEMENTS**

National Vocational and Technical Training Commission (NAVTTC) extends its gratitude and appreciation to representatives of business, industry, academia, government agencies, provincial TEVTAs, sector skill councils and trade associations who spared time and extended their expertise for the development of National Vocational Qualification for the trade of **Mobile App, Web & Game Development**. This work would not have been possible without the technical support of the above personnel.

NAVTTC initiated development of CBT&A based qualifications for 200 traditional / hi-tech trades under the Prime **Minister’s Hunarmand Pakistan Program**, focusing on Development & Standardization of 200 Technical & Vocational Education & Training (TVET) Qualifications. NAVTTC efforts have received full support from the Ministry of Federal Education and Professional Training which highly facilitated progress under this initiative.

It may not be out of place to mention here that all the experts of Industry, Academia and TVET experts of TEVTAs, BTEs and PVTC work diligently for making this qualification worthy and error free for which all credit goes to them. However, NAVTTC accepts the responsibility of all the errors and omissions still prevailing in the Qualification document.

It is also noteworthy that development of Skill Standards is a dynamic and ongoing process, and the developed skill standards needs periodic review and updating owing to the constant technological advancements, development in scientific knowledge, and growing experience of implementation at the grass root level as well as the demand of industry. NAVTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

**Dr. Nasir Khan**

**Executive Director (NAVTTC)**



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## 1. Introduction

The importance of modern gadgets in our everyday life and activities is undeniably unending. This is so because there is ongoing tremendous transformation in which mobile phones, laptops and other devices are no longer the ordinary device they used to be. They have become the colossal point of attention for individuals and businesses alike, courtesy of the various incredible features and opportunities that they offer. The cumulative progress of technology, the availability and access to high speed internet and the remarkable communicative interface in these devices results into a whole level of new and innovative experience.

Web designing is the computer field which deals with the creation of websites and web application. The person who deals with the creation of websites and web application is known as a web designer or web developer. The best part of being a web developer is that they are employed by almost every organization and they can even work independently as a freelancer.

Mobile phones and devices have become such a ubiquitous part of our everyday lives that it's difficult to imagine going through an entire day without one. This shift to ubiquity has been driven largely in part by the increasing scope of mobile application development. Over just the past few years an explosion in not just the scope but also the depth of utility of these devices has occurred which rivals, if not exceeds that seen in any other discrete class of technology.

Game Development is the art of creating games and describes the design, development and release of a game. It may involve concept generation, design, build, test and release. While you create a game, it is important to think about the game mechanics, rewards, player engagement and level design.

Being conscious of the emerging trends in the market, National Vocational & Technical Training Commission (NAVTTC) has developed competency standards in consultation with the stakeholders including academia, researchers, industry, chambers and TEVTAs for '**Mobile App, Web & Game Development**' under National Vocational Qualifications Framework (NVQF). The competency standards document has been designed in a way that trainees can develop skill in the ability to explore and analyze writing in technical, scholarly and professional contexts. They can consolidate their knowledge and skills through advanced practice in writing, editing, designing and producing texts for professional and technical purposes, with concrete application on industry sourced documents and projects.



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The National Competency Standards could be used as a referral document for the development of curriculum to be used by training institutions.

## **2. Purpose of the Qualification**

The purpose of this qualification is to set the highly professional standards for the Mobile App, Web & Game Development in order to compete local and international job market. The specific objectives of developing these qualifications are as under:

- Empower the youth with globally required employable skills.
- Produce competitive Web, Mobile App and Game Developers.
- Produce a skilled youth for Mobile App, Web & Game Development Industry.
- Improve the quality and effectiveness of the training and assessment for Mobile App, Web & Game Development Industry.



### 3. Date of Validation

The level 5 of National DAE qualification for ‘Mobile App, Web & Game Development’ has been validated by the Qualifications Validation Committee (QVC) members on 4<sup>th</sup> -8<sup>th</sup> August, 2020 and will remain valid for ten years i.e. **8<sup>th</sup> August, 2030**

### 4. Date of Review

The level 5 of National DAE qualification for ‘Mobile App, Web & Game Development’ has been validated by the Qualifications Validation Committee (QVC) members on 4<sup>th</sup> -8<sup>th</sup> August, 2020 and will remain valid for ten years i.e. **9<sup>th</sup> August, 2023**

### 5. Codes of Qualifications

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

ISCED Classification	
Code	Description
0613-S&AD&A(1)	1 <sup>st</sup> Level National Certificate of level-5, in “ Mobile App, Web & Game Development Technology”
0613-S&AD&A(2)	2 <sup>nd</sup> Level National Certificate of level-5, in “Mobile App, Web & Game Development Technology”
0613-S&AD&A(3)	3 <sup>rd</sup> Level National Certificate of level-5, in “Mobile App, Web & Game Development Technology”
0613-S&AD&A(4)	4 <sup>th</sup> Level National Certificate of level-5, in “Mobile App, Web & Game Development Technology”
0613-S&AD&A(5)	5 <sup>th</sup> Level National Certificate of level-5, in “Mobile App, Web & Game Development Technology”



## 6. Members of Qualification Development Committee

The following members participated in the qualification development process at PITAC, Lahore.

**Date:** 6<sup>th</sup> to 10<sup>th</sup> July'2020

S#	Name	Designation	Organization
1.	Mr. Atif Bashir	Faculty member CS/Visiting Faculty	NCBA&E Lahore/UCP Lahore
2.	Mr. Muzammil Hassan	Assistant Manager Research (Software Systems)	KICS UET Lahore
3.	Mr. Fahad Sabah	System/Business Analyst	Techno Dessert Lahore
4.	Mr. Tariq Aziz	System/Business Analyst	Soft Villa Solutions
5.	Mr. Ahmad Hassan	Sr. Web Developer	Black Urban Tech
6.	Mr. Goher Iqbal Punn	Faculty Member CS	KICS UET Lahore
7.	Mr. Muhammad Adrees	Assistant Professor CS	The University of Lahore
8.	Mr. Muhammad Imran Shafi	Assistant Professor CS	The University of Lahore
9.	Mr. Rehan Ahmad	Assistant Professor CS	The University of Lahore
10.	Ms. Syeda Farah Rehman	Sr. Instructor IT	P-TEVTA
11.	Ms. Fatima Iqbal	Representative of PBTE	PBTE
12.	Mr. Hafeez Abbasi	Director	S-TEVTA
13.	Mr. Aijaz Ahmed Zia	DACUM Facilitator/D&A Engr.	INTECH/UET Lahore
14.	Mr. Sikandar Masood	Director SS&C	NAVTTTC



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## 7. Qualification Validation Committee

The following members participated in the qualification development process at PITAC, Lahore.

**Date:** 4<sup>th</sup> to 8<sup>th</sup> August'2020

S#	Name	Status in Committee	Organization
1.	Ms. Amanullah Chaudhry	Representative of PBTE	PBTE
2.	Mr. Liaquat Ali Jamhro	Representative of S-TEVTA	Sindh-TEVTA
3.	Mr. Shadab Ali Shah	Representative of KP-TEVTA	KP-TEVTA
4.	Mr. Mushtaq Ahmed	Representative of P-TEVTA	Punjab-TEVTA
5.	Engr. Waqas Aziz	Representative of AJK-TEVTA	AJK-TEVTA
6.	Ms. Tehmina Amanat	Representative of PVTC	PVTC
7.	Mr. Muhammad Imran Shafi	Assistant Professor CS/Expert	The University of Lahore
8.	Mr. Rehan Ahmad	Assistant Professor CS/Expert	The University of Lahore
9.	Ms. Syeda Farah Rehman	Sr. Instructor IT/Expert	P-TEVTA
10.	Mr. Arsalan Chaudhry	Project Manager/ Industry	Tower Technologies
11.	Mr. Mohammad Noman	Web Developer/Industry	Corvit Systems Lahore
12.	Mr. Muzammil Hassan	Assistant Manager Research (Software Systems)/Industry	Sumico Technologies/KICS UET
13.	Mr. Aijaz Ahmed Zia	DACUM Facilitator/D&A Engr.	INTECH/UET Lahore
14.	Mr. Sikandar Masood	Director SS&C	NAVTTTC



## 8. Minutes of Meetings



### Report Regarding Validation of Competency Standards for National Vocational Qualifications Level 5 for Mobile App, Web and Game Development



#### Minutes of Meeting

A meeting of Qualification Review and Validation Committee for the trade of "Mobile App, Web and Game Development" was held at Pakistan Industrial Technical Assistance Center, Lahore from 4<sup>th</sup> – 8<sup>th</sup> August, 2020. The following activities took place during meeting:

1. Introduction of OP & CS file to the new participants
2. Detailed discussion regarding validation process
3. Consultation was made with the relevant industry experts to confirm the accuracy of the competency standards
4. Levels of competency standards were defined according to NVQF Level Descriptor
5. Prepared the mapping and packaging of CS as per expert's guidelines.
6. Assigned the credit hours for CS as per PBTE & NVQF guidelines.
7. Revision of competency standards as per Industry/TEVTAs /BTEs requirements.
8. Tools and equipment lists were revised as per industry requirements.
9. Time allocation for contact hours was discussed with the industry and academia representatives and adjusted accordingly.
10. Competency standards were packed in National Occupational Standards in 4 certifications of Levels 2, 3, 4 and 5 according to NVQF guidelines

The following experts has participated in the CS Review and Validation Committee meeting and showed their consent to validated competency standards as found them according to the requirements of the industry:

S#	Name	Status in Committee	Signatures
1)	Syeda Farah Rehman	Senior Instructor (IT), PTEVTA /Expert	Farah
2)	Mr. Rehan Ahmad	CEO, ShopVilla.com /Expert	Rehan
3)	Muhammad Imran Shafi	Asstt. Prof.(CS Deptt) UOL/Expert	Imran
4)	Mr. Amanullah Ch.	Representative of PBTE	Amanullah
5)	Mr. Liaqat Jhamro	Representative of Sindh TEVTA	Liaqat
6)	Mr. Shadab Ali Shah	Representative KP TEVTA	Shadab
7)	Mr. Mushtaq Ahmad	Representative of Punjab TEVTA	Mushtaq
8)	Engg. Waqas Aziz	Representative of AJK TEVTA	Waqas
9)	Ms. Tehmina Amanat	Representative of PVTC	Tehmina
10)	Mr. Arsalan Ch.	Project Manager, Web Development Punjab Group of Colleges /Freelancer	Arsalan
11)	Mr. Muhammad Noman	Web Developer / Industry	Noman
12)	Mr. Muzzamil Hassan	Sumico Technologies / Industry	Muzzamil
13)	Mr. Aijaz Ahmed Zia	DACUM Facilitator	Aijaz
14)	Mr. Sikandar Masood	Coordinator	Sikandar



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## 9. Entry Requirements

The entry for D.A. E National Certificate level 5, in ‘**Mobile App, Web & Game Development**’ are:

1. A person having **National Vocational Certificate level 4, in Mobile App, Web & Game Development**’
2. A person having **Matric certificate with Science/Arts subjects**

## 10.Regulation of the qualification and schedule of units

Not Applicable



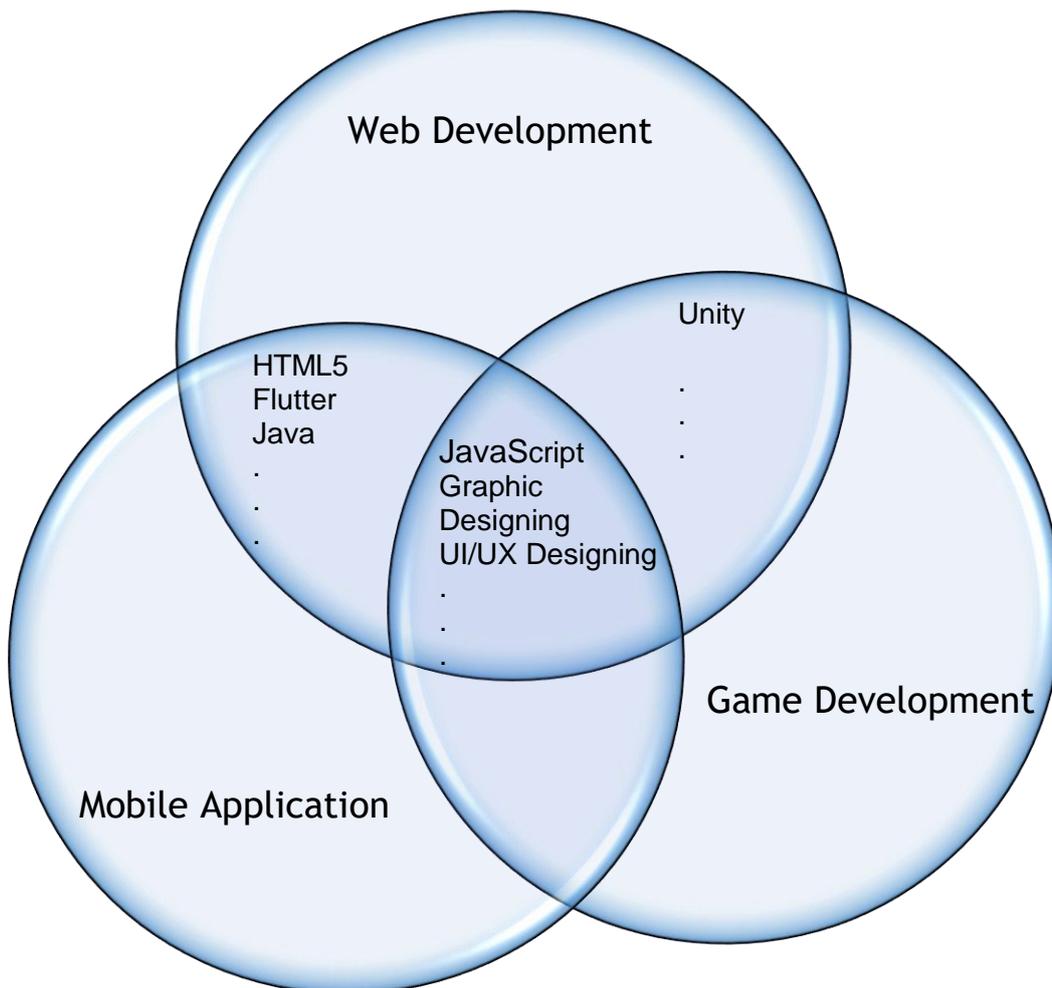
## 11. Generic Modules with respective levels

- |                             |         |
|-----------------------------|---------|
| ▪ Health and Safety         | LEVEL 2 |
| ▪ Digital Skills            | LEVEL 3 |
| ▪ Soft Skills & Freelancing | LEVEL 4 |
| ▪ Entrepreneurship          | LEVEL 5 |



## 12. Mapping of the Qualification

# Mapping of the Qualifications





### 13. Summary of competencies

Sr No	Competency Standards	Occupation	NVQF Level	Category	Estimated Contact Hours			Cr Hr
					Th	Pr	Total	
<b>Level 5</b>								
1	Explore/Install gaming framework	<b>Game Developer</b>	5	Technical	7	18	25	2.5
2	Create New Project of gameplay		5	Technical	12	24	36	3.6
3	Produce prototypes of gameplay ideas and features		5	Technical	12	24	36	3.6
4	Generate game scripts and storyboards		5	Technical	12	24	36	3.6
5	Animate characters and objects		5	Technical	9	30	39	3.9
6	Insert audio/video features of the game		5	Technical	6	18	24	2.4
7	Explore/Use X-Reality		5	Technical	5	15	20	2
9	Implement basic programming skills to apply server side architecture	<b>Back-end Web Developer</b>	5	Technical	12	27	39	3.9
10	Integrate database with server side programming language		5	Technical	8	12	20	2
11	Implement MVC framework to develop web application		5	Technical	14	18	32	3.2
12	Integrate views and partial views with MVC		5	Technical	12	18	30	3
13	Integrate template engine with MVC application		5	Technical	12	18	30	3
14	Prepare web views for smart devices		5	Technical	12	18	30	3
15	Build Logic through Programming	<b>Android Developer</b>	4	Technical	10	21	31	3.1
16	Install/configure android Studio		4	Technical	12	18	30	3
17	Build Mobile Application		4	Technical	12	24	36	3.6
18	Test, Debug and use support libraries		4	Technical	12	18	30	3
19	Build robust UI for greater UX (user Experience)		4	Technical	12	18	30	3
20	Program/use background applications		4	Technical	12	18	30	3
21	Save user data/Integrate android application with database		4	Technical	6	9	15	1.5
22	Manage version control system to store repositories on cloud side	<b>Software Configuration Manager</b>	5	Technical	12	18	30	3
23	Manage web and cloud Hosting		5	Technical	12	18	30	3
24	Configure web server on local environment		5	Technical	6	9	15	1.5
25	Configure/Manage indigenous open		5	Tech	16	24	40	4



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	source Control Panel for Webhosting like CWP (Server end)			nical				
26	Use Control panel to manage hosting (Client Account)		5	Technical	10	15	25	2.5
27	Deploy Mobile applications and Games on cloud		5	Technical	10	15	25	2.5
28	Gather/elicitate client requirement	<b>Full Stack Developer</b>	5	Technical	18	24	42	4.2
29	Write program for client side (using JS, JQuery, Angular/VUE)		5	Technical	18	24	42	4.2
30	Program a server side (using PHP, ASP, Python, Node)		5	Technical	18	24	42	4.2
31	Program a Database (Using SQL, MySQL, SQLite, and PostgreSQL)		5	Technical	18	27	45	4.5
32	Perform Testing of Application		5	Technical	12	18	30	3
33	Manage Project		5	Technical	18	27	45	4.5
34	Develop entrepreneurial skills		<b>Entrepreneurship</b>	5	Generic	12	15	27
35	Apply management and communication techniques	5		Generic	8	15	23	2.3
36	Create human resource management plan	5		Generic	8	15	23	2.3
37	Develop project management plan	5		Generic	8	15	23	2.3
38	Develop sales plan	5		Generic	8	15	23	2.3
39	Conduct research for customer needs and satisfaction	5		Generic	12	15	27	2.7
40	Manage finances	5		Generic	12	15	27	2.7
41	Identify and resolve problems	5	Generic	12	15	27	2.7	
	<b>Total</b>				<b>457</b>	<b>753</b>	<b>1210</b>	<b>121</b>
	<b>Percentage</b>				<b>37.77</b>	<b>62.23</b>		

## OCCUPATIONS AND LEVELS DESCRIPTOR-MOBILE APP, WEB & GAME DEVELOPMENT

Level 2	Level 3	Level 4	Level 5

S #	Occupations	No of Modules/CS	Level	Occupation Credit Hours	Training duration
1.	Game Developer	7	5	22	6 Months



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<b>2.</b>	<b>Back-end Web Developer</b>	<b>6</b>	<b>5</b>	<b>18</b>	<b>3 Months</b>
<b>3.</b>	<b>Android Developer</b>	<b>7</b>	<b>5</b>	<b>22</b>	<b>6 Months</b>
<b>4.</b>	<b>SCM-Software Configuration Manager</b>	<b>6</b>	<b>5</b>	<b>17</b>	<b>3 Months</b>
<b>5.</b>	<b>Full Stack Developer</b>	<b>6</b>	<b>5</b>	<b>25</b>	<b>6 Months</b>



## 14. Qualification Levelling and Packaging

### Level 5

*(Game Developer, Back-end Web Developer, Android Developer, Software, Configuration Manager, Full Stack Developer, Entrepreneurship)*

#### **Game Developer**

1. Explore/Install gaming framework
2. Create New Project of gameplay
3. Produce prototypes of gameplay ideas and features
4. Generate game scripts and storyboards
5. Animate characters and objects
6. Insert audio/video features of the game
7. Explore/Use X-Reality

#### **Back-end Web Developer**

1. Implement basic programming skills to apply server side architecture
2. Integrate database with server side programming language
3. Implement MVC framework to develop web application
4. Integrate views and partial views with MVC
5. Integrate template engine with MVC application
6. Prepare web views for smart devices

#### **Android Developer**

1. Build Logic through Programming
2. Install/configure android Studio
3. Build Mobile Application
4. Test, Debug and use support libraries
5. Build robust UI for greater UX (user Experience)
6. Program/use background applications
7. Save user data/Integrate android application with database

#### **Software Configuration Manager**

1. Manage version control system to store repositories on cloud side
2. Manage web and cloud Hosting
3. Configure web server on local environment



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4. Configure/Manage indigenous open source Control Panel for Webhosting like CWP (Server end)
5. Use Control panel to manage hosting (Client Account)
6. Deploy Mobile applications and Games on cloud

### **Full Stack Developer**

1. Gather/elicitate client requirement
2. Write program for client side (using JS, JQuery, Angular/VUE)
3. Program a server side (using PHP, ASP, Python, Node)
4. Program a Database (Using SQL, MySQL, SQLite, and PostgreSQL)
5. Perform Testing of Application
6. Manage Project

### **Entrepreneurship**

1. Develop entrepreneurial skills
2. Apply management and communication techniques
3. Create human resource management plan
4. Develop project management plan
5. Develop sales plan
6. Conduct research for customer needs and satisfaction
7. Manage finances
8. Identify and resolve problems



## 15. Detail of Qualifications and its Competency Standards

### A. Technical Competencies

#### 1. *Game Developer*

##### 0613-S&AD&A-1. Explore/Install Game development framework

**Overview:** After this competency standard candidate will be able to install gaming framework.

Competency Unit	Performance Criteria
CU1. Explore game development framework	<p>P1. Explore Multiple platforms and Game Engines</p> <p>P2. Explore primary features of game engines.</p> <p>P3. Explore primary functionality of game engines.</p> <p>P4. Develop Game environment</p> <p>P5. Select suitable Game Environment</p>
CU2. Install game development framework	<p>P1. Install Game development framework</p> <p>P2. Configure Game development framework</p>

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Basic Knowledge of Game Development & Design
- Knowledge of Game Development Tools and software

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System of minimum ci5



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2.	Internet Connectivity,
3.	Unity 2019 Version or any other
4.	Any IDE like Visual Studio Code

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Install unity game engine by creating account on unity
- Integrate game engine with visual studio



### 0613-S&AD&A-2. Create New Project of gameplay

**Overview:** After this competency standard candidate will be able to learn how to write complete and efficient code to develop a new game.

Competency Unit	Performance Criteria
<b>CU1. Set up game development environment</b>	<b>P1.</b> Explore Framework Interface <b>P2.</b> Create Gameplay project <b>P3.</b> Make Scenes of gameplay <b>P4.</b> Make Game objects of gameplay. <b>P5.</b> Add interactivity to your Project.
<b>CU2. Design game work flow</b>	<b>P1.</b> Design C# Script Flow Cycle <b>P2.</b> Design Code repositories <b>P3.</b> Create Scripts of Game Objects
<b>CU3. Explore Package Manager</b>	<b>P1.</b> Find specific version of each Package <b>P2.</b> Install new package from registry <b>P3.</b> Configure package from local folder <b>P4.</b> Edit the Project manifest to install packages from all location <b>P5.</b> Switch versions of a package already installed. <b>P6.</b> Remove a package from your Project. <b>P7.</b> Enable / Disable built-in packages. <b>P8.</b> Debug packages for conflicts and errors

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Knowledge of Core Programming Concepts



## Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System of minimum ci5
2.	Internet Connectivity,
3.	Unity 2019 Version or any other
4.	Any IDE like Visual Studio Code

## **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Limited Time – Script Oriented modules
- Scripting Puzzles



### 0613-S&AD&A-3. Produce prototypes of gameplay ideas and features

**Overview:** After this competency standard candidate will be able to learn the core mechanics of game development in any platform like Unity

Competency Unit	Performance Criteria
<b>CU1. Import Models of Gameplay</b>	<b>P1.</b> Create/Import humanoid characters <b>P2.</b> Use humanoid characters in the game <b>P3.</b> Configure Model Import Settings <b>P4.</b> Import Assets which create outside of framework <b>P5.</b> Set Mode for 2D / 3D Graphic Interface
<b>CU2. Explore Input Manager Window</b>	<b>P1.</b> Control Your Game through input Device <b>P2.</b> Configure Mobile Device Input for gameplay <b>P3.</b> Configure XR(X-Reality) Input for gameplay
<b>CU3. Make Real-time Global Illumination</b>	<b>P1.</b> Configure different render pipelines process <b>P2.</b> Use camera tool to create a scene space <b>P3.</b> Explore post-processing of Scene <b>P4.</b> Explore Graphic tools for create real-time Global Illumination
<b>CU4. Explore Physics Engines</b>	<b>P1.</b> Install 2D / 3D physics engines <b>P2.</b> Configure 2D / 3D physics engines

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Unity Game Engine Basic Knowledge
- C# Scripting



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### **Tools and Equipment**

The tools and equipment required for this competency standard are given below:

<b>S. No.</b>	<b>Items</b>
1.	Computer System of minimum ci5
2.	Internet Connectivity,
3.	Unity 2019 Version or any other
4.	Any IDE like Visual Studio Code

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Mid-Level – Game Project



### 0613-S&AD&A-4. Generate game scripts and storyboards

**Overview:** After this competency standard candidate will be able to write complex AI scripts and controllers for the character

Competency Unit	Performance Criteria
CU1. Generate game scripts	P1. Create Script to respond input from the player P2. Create a structure that implements IJob.
CU2. Use Plugins	P1. Explore plugins for different platforms P2. Install plugins where needed P3. Configure installed plugins
CU3. Create Story Board	P1. Control the networked state of the game P2. Send and receive network messages P3. Make remote procedure calls (RPCs) from servers to clients. P4. Send networked events from servers to clients. P5. Set a Multiplayer Project P6. Create matches / advertise matches.

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Basic Knowledge of Game Development & Design
- Knowledge of Programming Concepts
- Describe OOP Programming Language Concepts
- Strong analytical frame of mind
- Explain the features of Unity Engine

### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System of minimum ci5
2.	Internet Connectivity,



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3.	Unity 2019 Version or any other
4.	Any IDE like Visual Studio Code

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Story Writing Skills
- C# scripting expertise
- Unity – Game Engine Expertise



### 0613-S&AD&A-5. Animate Characters and objects

**Overview:** After this competency standard candidate will be able to animate characters and objects in the game

Competency Unit	Performance Criteria
<b>CU1. Create Animation of characters</b>	<b>P1.</b> Handle Mechanism System <b>P2.</b> Animate 2d sprite character <b>P3.</b> Animate 3d models character <b>P4.</b> Design Animator for the game object <b>P5.</b> Work with different Animations <b>P6.</b> Create Legacy, Humanoid / Generic Animations
<b>CU2. Manage the various animation states</b>	<b>P1.</b> Explore Animator Controller <b>P2.</b> Create Animator Controller <b>P3.</b> Configure Animator Controller <b>P4.</b> Use Animator Controller to set animations of characters

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Thorough knowledge of Mechanism System
- Rigging

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Computer System
2	Internet Connection
3	Unity 2019 Version
4	Visual Studio 2019, Adobe Photoshop, Adobe Illustrator

#### **Critical Evidence(s) Required**



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The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- 3D Animation – Cut scene
- 2D Animation - Cut scene



### 0613-S&AD&A-6. Insert Audio / video features of the game

**Overview:** After this competency standard candidate will be able to use audio and video features in the game.

Competency Unit	Performance Criteria
<b>CU1.Add Audio features</b>	<b>P1.</b> Attach Audio source to objects <b>P2.</b> Add Audio Source to another object <b>P3.</b> Explore Different audio filters <b>P4.</b> Add Different Audio Filters <b>P5.</b> Explore Different Audio Plugins <b>P6.</b> Install Audio plugin <b>P7.</b> Use Audio Plugin
<b>CU2.Integrate video into your game</b>	<b>P1.</b> Explore Video Player Component <b>P2.</b> Configure Video Player Component <b>P3.</b> Migrate from Movie Texture to video player

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Knowledge of Unity Engine
- Illustrate audio/video features

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Computer System
2	Unity 2019 Version
3	Visual Studio 2019

#### Critical Evidence(s) Required



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The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Adding Sounds – In a prebuild Project.
- Adding Particle Effects – In a prebuild Project.



### 0613-S&AD&A-7. Explore/use X -Reality

**Overview:** After this competency standard candidate will be able to use X-Reality plugins in VR applications

Competency Unit	Performance Criteria
<b>CU1. Use XR tools</b>	<b>P1.</b> Explore different types of X-Reality (XR) <b>P2.</b> Install XR plugin Management System <b>P3.</b> Configure XR plugin Management System
<b>CU2. Set-up tracking in the XR plug-in framework</b>	<b>P1.</b> Start with a New Scene <b>P2.</b> Identify Your Scene types <b>P3.</b> Migrate a Simple Scene <b>P4.</b> Configure your project for XR

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Knowledge of Virtual Reality

### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1	Computer System
2	Internet Connection
3	Unity 2019 Version
4	Visual Studio 2019
5	Android Device for testing
6	VR Controller
7	AR Scanner Camera device

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:



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- Mid-Level – Virtual Reality Module.
- Mid-Level – Augmented Reality Module.



## 2. Back-end Developer

### 0613-S&AD&A-8. Implement Basic Programming Skills to apply Server-Side Architecture

**Overview:** This competency standard covers the skills to implement server side architecture for web applications. For example, how to implement MVC architecture or singleton design pattern in a web application?

Competency Unit	Performance Criteria
CU1. Identify Architectural Components	<p>P1. Search well-known architectural components</p> <p>P2. List the components relevant to web application</p>
CU2. Identify relationships among Architectural Components	<p>P1. Analyze requirement specification</p> <p>P2. Write the architectural components' dependency on other components</p>
CU3. Develop APIs for Architectural Components	<p>P1. List the classes and interfaces required to develop architectural components</p> <p>P2. List the methods associated with every class</p> <p>P3. List the parameters and return types for all methods</p>
CU4. Implement Architectural Components	<p>P1. Write down the classes decided in developed APIs</p> <p>P2. Implement methods and interfaces</p>
CU5. Test Architectural Components	<p>P1. Design unit tests for architectural components</p> <p>P2. Execute unit tests</p> <p>P3. Fix the bugs identified during testing</p>

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Understanding of what a web application is
- Understanding the need and purpose of design patterns and architectural components
- Knowledge of the component of web architectures
- Understanding the relationship and dependency of architectural components on other components

### Tools and Equipment



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The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Web Browser
2.	Search Engine
3.	Internet Connection
4.	Xamp
5.	Apache
6.	Server side programming language (PHP, ASP, JSP etc.)
7.	IDE (Zend Studio, Visual Studio, Eclipse, Komodo etc.)

### Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Create web application
- Understand how to design and implement web application component
- Understand how to create APIs for web application
- Understand the components of web architecture (MVC)
- Implement architecture in web application



### 0613-S&AD&A-9. Integrate Database with Server Side Programming Language

**Overview:** This competency standard covers the skills to design and develop database layer for web applications. This standard also includes the skill to integrate data layer with other layers of web applications:

Competency Unit	Performance Criteria
CU1. Design Database	<p>P1. Identify database entities</p> <p>P2. Set relationship among database entities</p> <p>P3. Create tables fulfilling database requirements</p>
CU2. Populate Database with Test Data	<p>P1. Collect sample data for database</p> <p>P2. Populate database with collected data</p>
CU3. Develop Database APIs	<p>P1. Write code to establish connection with database</p> <p>P2. Write code to implement classes and interfaces</p>
CU4. Implement Database Operations	<p>P1. Write code to implement database operations</p> <p>P2. Implement complex database operations by using already implemented methods, classes and interfaces</p>
CU5. Test Operations	<p>P1. List test cases (unit tests) for database operations</p> <p>P2. Execute test cases to validate database operations</p> <p>P3. Fix the bugs if found</p>

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Understanding the components of web application
- Knowledge of designing database for a web application
- How to integrate database layer with web application?
- How to write code for database operations?

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Web Browser
2.	Search Engine
3.	Internet Connection



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4.	Xamp
5.	Apache
6.	IDE (Zend Studio, Rapidphpeditor, Eclipse, Komodo etc)
7.	MySQL

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Develop components of a web application
- Design database for a web application
- Implement database operations
- Integrate database layer with web application



## 0613-S&AD&A-10. Implement MVC Framework to Develop Web Application

**Overview:** This competency standard covers the skills to develop web application using Model view controller (MVC) framework. For example, how to develop a university application for courses registration using MVC architecture.

Competency Unit	Performance Criteria
CU1. Explore MVC Options	<p>P1. Search MVC options available in Market</p> <p>P2. List the features of every MVC framework</p>
CU2. Select MVC framework	<p>P1. Compare the features of every MVC framework</p> <p>P2. Select a MVC framework as per requirements</p>
CU3. Implement Model Layer	<p>P1. Identify model entities</p> <p>P2. Write methods/classes to store data into model</p> <p>P3. Write methods/classes to update data into model</p> <p>P4. Write method/classes to retrieve data from model</p> <p>P5. Apply constraints on model operations</p>
CU4. Implement Controller Layer	<p>P1. Identify the controller scenarios of application</p> <p>P2. Implement the controller component of application</p>
CU5. Implement View Layer	<p>P1. Identify the view classes</p> <p>P2. Implement view classes, interfaces and methods</p>
CU6. Test the implementation of MVC Architecture	<p>P1. List test cases for model, view and controller classes</p> <p>P2. Execute test cases</p> <p>P3. Fix the bugs if found</p>

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- How to develop web applications?
- Understanding of MVC architecture
- How to develop Model, View and Controller components for a web application?
- How to implement a web application using MVC

### Tools and Equipment



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The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Web Browser
2.	Search Engine
3.	Internet Connection
4.	Xamp
5.	Apache
6.	IDE (Zend Studio, Rapidphpeditor, Eclipse, Komodo etc)
7.	MySQL

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Describe MVC architecture
- Develop Model, View and Controller components for a web application
- Implement a web application using MVC



## 0613-S&AD&A-11. Integrate Views and Partial Views with MVC

**Overview:** This competency standard covers the skills to develop views and partial views for a web application. Also includes the skills to integrate views and partial views with MVC architecture. For example, develop and integrate views for a course registration web application.

Competency Unit	Performance Criteria
CU1. Design Views	<p>P1. Collect the requirements to be fulfilled by views</p> <p>P2. Add visual elements in views fulfilling the requirements</p> <p>P3. Adjust visual elements keeping in view of UI/UX requirements</p>
CU2. Add views into View component of MVC	<p>P1. Add designed views into view component of MVC</p> <p>P2. Identify the application data to be mapped onto view elements</p>
CU3. Register view with Controller component	<p>P1. Identify application scenario to be handled by view</p> <p>P2. Make necessary changes into controller component to register view with it</p>
CU4. Map data from model component of MVC onto visual elements of views	<p>P1. Identify the data values that will be mapped onto view elements</p> <p>P2. Implement mapping of data values onto view elements</p>
CU5. Test the views	<p>P1. Deploy the views in test environment</p> <p>P2. List all the unit tests for view mapping</p> <p>P3. Execute the unit tests on in testing environment</p> <p>P4. Fix the bugs if found</p>

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes :

- Understands the web-application’s needs for views and partial views
- Knowledge of designing views and partial views for web application
- Understand how to integrate views in a MVC application
- Understand to resolve issues during integration activity

### Tools and Equipment

The tools and equipment required for this competency standard are given below:



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S. No.	Items
1.	Web Browser
2.	Search Engine
3.	Internet Connection
4.	Xamp
5.	Apache
6.	IDE (Zend Studio, Rapidphpeditor, Eclipse, Komodo etc)
7.	MySQL

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Design views and partial views for web application
- Integrate views in a MVC application
- Resolve issues during integration activity



**0613-S&AD&A-12. Integrate Template Engine with MVC Application**

**Overview:** This competency standard covers the integrate the template engine with MVC application.

Competency Unit	Performance Criteria
CU1. Search the template engines	P1. Search the available template engines P2. List the features offered by every engine
CU2. Select the template engine for application	P1. Compare the features offered by template engines P2. Select the template engine as per application requirements
CU3. Install the template engine with MVC application	P1. Download suitable template engine P2. Install the engine in the application environment P3. Adjust anti-virus and firewall to allow working of template engine
CU4. Configure the template engine	P1. Identify the template files to be used by template engine P2. Configure the template engine as per application needs
CU5. Create template files for application	P1. Create the template files to be used by template engine P2. Host the template files in appropriate folder where template engine suggests
CU6. Test the functionality of template engine	P1. List test cases for template engine P2. Execute test cases P3. Fix the bugs if found

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes :

- Understand the working of a template engine
- Knowledge the important features of template engines
- Knowledge how to install and configure template engine
- Understand how to develop template files



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### **Tools and Equipment**

The tools and equipment required for this competency standard are given below:

<b>S. No.</b>	<b>Items</b>
1.	Web Browser
2.	Search Engine
3.	Internet Connection
4.	Xamp
5.	Apache
6.	IDE (Zend Studio, Rapidphpeditor, Eclipse, Komodo etc)
7.	MySQL
8.	Template Engine (Mustache, Plates, Blade, Volt, Dwoo, Smarty, Twig)

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Install and configure template engine
- Develop template files
- Integrate template engine with MVC



### 0613-S&AD&A-13. Prepare Web Views for Smart Devices

**Overview:** This competency standard covers the skills develop web views for smart devices. For example, develop the web views for course registration smart phone application.

Competency Unit	Performance Criteria
CU1. Make website responsive	<p>P1. Add responsive meta tags into your pages</p> <p>P2. Apply media queries to your layouts</p>
CU2. Use compressed images in your views	<p>P1. Identify the images to be used into your views</p> <p>P2. Compress the images before using them onto your views</p>
CU3. Test the web views	<p>P1. List test cases for smart devices</p> <p>P2. Execute test cases</p> <p>P3. Fix the bugs</p>

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes :

- Understand the limitations of smart devices
- Understand the implications of small size of smart devices
- Understand how to develop views for smart devices

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Web Browser
2.	Search Engine
3.	Internet Connection
4.	Xamp
5.	Apache
6.	IDE (Zend Studio, Rapidphpeditor, Eclipse, Komodo etc)
7.	MySQL



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**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Understand the limitations of smart devices
- Understand the implications of small size of smart devices
- Understand how to develop views for smart devices



### 3. Software Configuration Manager – SCM (5)

#### 0613-S&AD&A-14. Manage version control system to store repositories on cloud side

**Overview:** After this competency standard candidate will be able to manage and deploy any code versioning control system.

Competency Unit	Performance Criteria
<b>CU1. Setup Versioning Control System</b>	<b>P1.</b> Setup version control system to store repositories on cloud side <b>P2.</b> Setup / add user accounts on cloud repository <b>P3.</b> Install / Setup local copy of repository on developer's systems
<b>CU2. Use Versioning control system</b>	<b>P1.</b> Integrate the local copy with development environment <b>P2.</b> Implement branches and sub-branches in version control system

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Explain the need of version control system
- Explore and compare different sub-versioning system like git / svn etc.
- Managing users and on version control system

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System min 5 generation with 8 GB ram
2.	Internet Connection
3.	Web Browser, SVN
4.	Search Engines
5.	Development kit

#### **Critical Evidence(s) Required**

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Install and setup version control system
- Deploy code on repository system
- Configure client side repository system



## 0613-S&AD&A-15. Manage web and cloud Hosting

**Overview:**After this competency standard candidate will be able to find search and register a domain name.

Competency Unit	Performance Criteria
<b>CU1. Create account</b>	<b>P1.</b> Search a suitable registrar for domain name <b>P2.</b> Create Account on registrar platform <b>P3.</b> Set-up a profile
<b>CU2. Search domain name with Extension</b>	<b>P1.</b> Check Domain Name availability status with desire Top level domains (TLDs) <b>P2.</b> Select suitable platform as per requirement <b>P3.</b> Register a domain
<b>CU3. Manage domains through provided Dashboard</b>	<b>P1.</b> Explore Dashboard <b>P2.</b> Renew expired domain <b>P3.</b> Select Auto Renewal (if required) <b>P4.</b> Set domain duration <b>P5.</b> Transfer Domain <b>P6.</b> Activate Whois-Guard <b>P7.</b> Change custom name servers

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Enlist various Domain Registrar Platforms
- Define Domain
- Define Different TLD's
- Define NameServers
- Define Whois Guard
- Describe Domain Transfer

### Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	Registrar (Namecheap, Pknic, Godaddy, )



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**Critical Evidence(s) Required**

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Register a domain and change DNS value



**0613-S&AD&A-16. Configure web server on local environment**

**Overview:**After this competency standard candidate will be able to configure web server on local environment.

Competency Unit	Performance Criteria
<b>CU1. Configure network setting</b>	<b>P1.</b> Configure LAN <b>P2.</b> Configure Static IP on web server <b>P3.</b> Identify Network Topologies <b>P4.</b> Configure DSL
<b>CU2. Manage Firewall</b>	<b>P1.</b> Explore the functionality of firewall <b>P2.</b> Explore type of network attacks <b>P3.</b> Configure firewall <b>P4.</b> Explore Malwares <b>P5.</b> Configure antivirus <b>P6.</b> Scan and close unnecessary open ports <b>P7.</b> Configure DMZ (Demilitarized zone)
<b>CU3. Configure Web Server</b>	<b>P1.</b> Explore Different Web servers <b>P2.</b> Install Windows based Web servers <b>P3.</b> Configure windows-based web servers <b>P4.</b> Host Websites developed in different technologies <b>P5.</b> Install web server on linux/unix based systems <b>P6.</b> Configure linux/unix-based web servers <b>P7.</b> Host Websites developed in different technologies

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Define LAN
- Describe types of IP addresses
- How to configure DSL router
- Explain the Functionality of firewall
- Describe different types of malwares
- What is port and how it works?
- Explain diferent types of Web servers

**Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	DSL Device
5.	LAN



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6.	Static IP
7.	XAMPP

**Critical Evidence(s) Required**

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Host a web application on local area network and publish it to make it accessible



**0613-S&AD&A-17. Configure/Manage indigenous open source Control Panel for Webhosting (Server end)**

**Overview:**After this competency standard candidate will be able to configure web server on local environment.

Competency Unit	Performance Criteria
<b>CU1. Explore Hosting Management tool</b>	<b>P1.</b> Explore different types of web-host manager <b>P2.</b> Install web-host manager <b>P3.</b> Explore web-host manager functionality
<b>CU2. Configure web-host manager</b>	<b>P1.</b> Configure Cpanel Settings <b>P2.</b> Manage Server Profiles <b>P3.</b> Manage server time <b>P4.</b> Configure Terminal setting <b>P5.</b> Configure tweak settings
<b>CU3. Manage Accounts on web Host manager</b>	<b>P1.</b> Create a new account <b>P2.</b> Add a package <b>P3.</b> Manage resellers accounts <b>P4.</b> Terminate Accounts <b>P5.</b> Modify Accounts <b>P6.</b> Suspend Account
<b>CU4. Manage Transfers</b>	<b>P1.</b> Convert Addon domain to Account <b>P2.</b> Copy an account from another server <b>P3.</b> Review transfers and restores
<b>CU5. Manage Backups</b>	<b>P1.</b> Configure Backup <b>P2.</b> Restore Backup <b>P3.</b> Select user Backup <b>P4.</b> Restore File and Directory <b>P5.</b> Restore a Full backup/cpmove file
<b>CU6. Manage DNS zones</b>	<b>P1.</b> Add/Delete DNS zone <b>P2.</b> Add an Entry for Your Hostname <b>P3.</b> Edit DNS zone <b>P4.</b> Edit MX Entry <b>P5.</b> Edit Zone Templates <b>P6.</b> Reset a DNS zone
<b>CU7. Manage Plugins</b>	<b>P1.</b> Add/remove different Plugins <b>P2.</b> Configure Security & Firewall <b>P3.</b> Configure Scanner
<b>CU8. Manage SSL/TLS</b>	<b>P1.</b> Generate an SSL Certificate and signing request <b>P2.</b> Install an SSL Certificate on a domain <b>P3.</b> Manage Auto SSL <b>P4.</b> Manage SSL Hosts



### **Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Define different types of servers
- Describe Different types of Ip's
- Describe transfer hosting
- Define Different DNS ZONES

### **Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	Web Server
5.	Web Host Manager (Webmin, Ispconfig, vestacp)

### **Critical Evidence(s) Required**

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Install / Configure Application with Server
- Create hosting Against IP or Domain name
- Create Security Protocols against IP or domain name
- SETUP DKIM (Domain Keys Identified Mail) / SPF (Sender Policy Framework)



**0613-S&AD&A-18. Use Control panel to manage hosting (Client Account)**

**Overview:**After this competency standard candidate will be able to configure control panel to manage hosting.

Competency Unit	Performance Criteria
<b>CU1. Manage Files for hosting</b>	<b>P1.</b> Manage Files through file manager. <b>P2.</b> Create a Web Disk account <b>P3.</b> Modify and manage images <b>P4.</b> Set a password to protect certain directories <b>P5.</b> Monitor your account's available space <b>P6.</b> Add FTP Accounts <b>P7.</b> Configure FTP Accounts <b>P8.</b> Monitor visitors that are logged into your site through FTP <b>P9.</b> Create your website Backup <b>P10.</b> Create Git repositories <b>P11.</b> Manage Git repositories
<b>CU2. Manage Databases of hosting site</b>	<b>P1.</b> Create Database <b>P2.</b> Create database User <b>P3.</b> Add user to Database <b>P4.</b> Set privileges to users <b>P5.</b> Modify Databases
<b>CU3. Manage Domains for hosting</b>	<b>P1.</b> Manage your domains <b>P2.</b> Create Addon Domain <b>P3.</b> Manage Subdomain <b>P4.</b> Configure your website available from another domain name <b>P5.</b> Manage redirects <b>P6.</b> Configure Zone Editor
<b>CU4. Configure Email for Domain</b>	<b>P1.</b> Configure Email Accounts <b>P2.</b> Create an Email Account Forwarder <b>P3.</b> Route a domain's incoming mail <b>P4.</b> Configure Email Filters
<b>CU5. Manage Security for Domain Hosting</b>	<b>P1.</b> Configure SSH (Secure Shell) Access <b>P2.</b> Manage IP Blocker <b>P3.</b> Configure SSL (Secure Sockets Layer) / TLS (Transport Layer Security)
<b>CU6. Install open source CMS From Control panel</b>	<b>P1.</b> Configure Installation of CMS <b>P2.</b> Configure Database For CMS

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Describe File System



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- Describe Domain Types
- Explain Different types of Security protocols
- Describe Email system
- Define DNS Zones

**Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	Web Server
5.	Web Host Manager (Webmin, Ispconfig, vestacp)

**Critical Evidence(s) Required**

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Manage File System of application Host on server
- Manage Backups of site
- Change DNS Zones
- Create Emails



**0613-S&AD&A-19. Deploy Mobile applications and Games on cloud**

**Overview:** This competency standard covers the skills and knowledge required to perform Deployment of Mobile Application Software and games.

Competency Unit	Performance Criteria
<b>CU1. Deploy application</b>	<b>P1.</b> Identify the technology needs <b>P2.</b> Select the suitable platform to deploy mobile application <b>P3.</b> Deploy on live App repository like playstore
<b>CU2. Validate deployment</b>	<b>P1.</b> Download / install app from Playstore or any other repository <b>P2.</b> Run application on device <b>P3.</b> Verify if the application is running properly or not <b>P4.</b> Check for updates

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Describe the prevalent trends in mobile app development market.
- Differentiate between the pre-production and post-production phases of a mobile app.
- Enlist any three popular mobile application platforms for deployment

**Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Computer System
2.	Internet Connection
3.	Web Browser
4.	App Stores Account (Google Play Store, Apple App Store, Samsung Glaxy APP )
5.	Computer System
6.	Internet Connection
7.	Web Browser



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**Critical Evidence(s) Required**

The candidate needs to produce following Critical Evidence(s) in order to be competent in this competency standard:

- Deploy the mobile app on google playstore after creating a new account



#### 4. Full Stack Developer

##### 0613-S&AD&A-20. Gather/elicitate client requirements

**Overview:** After this competency standard, candidate will be able to gather functional and non-functional requirements from the clients

Competency Unit	Performance Criteria
<b>CU1. Prepare plan to gather requirements</b>	<b>P1.</b> Search different strategies to gather requirements <b>P2.</b> List down the features of strategies <b>P3.</b> Compare the strategies on basis of pros and cons <b>P4.</b> Prepare formats of Interviews with clients <b>P5.</b> Make Surveys through Questionnaires
<b>CU2. Gather requirements to develop software</b>	<b>P1.</b> Prepare Software requirement specification (SRS) Document <b>P2.</b> Prepare Prototyping or visuals based on SRS <b>P3.</b> Collect/Record the feedbacks after prototyping <b>P4.</b> Update SRS as per feedback
<b>CU3. Validate Software Requirements</b>	<b>P1.</b> Analyze SRS Document <b>P2.</b> Remove Ambiguities <b>P3.</b> Identify the Scope of work / Tasks <b>P4.</b> Identify the completeness of SRS

#### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Explain the modes of Interviews: formal or informal, in person or virtually.
- Explain different Surveys or Questionnaires.
- Explain How to get feedback and input from end users. Workshops or Focus Groups
- What is meant by Prototyping? Describe in detail.
- How to clarify the client requirements?
- Describe the components of SRS Document

#### Tools and Equipment

The tools and equipment required for this competency standard are given below:



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S. No.	Items
1.	Survey gathering tools like surveyMonkey, Google Forms
2.	Online meeting platforms like (Zoom, Skype, Whatsapp, emails, phone calls)
3.	Search Engines
4.	MS Excel , MS Word, Power point

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Prepare an SRS Document of a model software development



**0613-S&AD&A-21. Write program for client side (using JS, JQuery, Angular/VUE)**

**Overview:**After this competency standard candidate will be able to:

- Develop a responsive website using HTML, JS, CSS and bootstrap.
- Design a mockup according to the SRS document
- Make a form validation in JS

Competency Unit	Performance Criteria
<b>CU1. Identify the structure and design of web pages</b>	<b>P1.</b> Identify the different components of web pages <b>P2.</b> Draft Design Layouts / mockups to implement design <b>P3.</b> Coordinate with Designers to Design the mockups according to the functional and non-functional requirements
<b>CU2. Develop features to enhance the user experience</b>	<b>P1.</b> Strike a balance between functional and aesthetic design <b>P2.</b> Maintain the brand consistency throughout design by identifying the fixed components of webpage <b>P3.</b> Improve the User Experience / User Interface
<b>CU3. Ensure optimized design for smartphones</b>	<b>P1.</b> Identify different types of screens and hand held devices <b>P2.</b> Implement the right framework to achieve the responsiveness <b>P3.</b> Implement the mockups to all screen sizes through frontend frameworks
<b>CU4. Utilize a variety of markup languages to write web pages</b>	<b>P1.</b> Identify the list of frontend frameworks that would be required to implement the frontend <b>P2.</b> Implement the code (HTML, CSS, JS and frameworks) to generate the frontend layouts using frameworks according to mockups <b>P3.</b> Refine the look and feel according to the mockups by customization process <b>P4.</b> Make the webpages interactive by deploying, JS, JQuery/VUE/or any framework and Ajax <b>P5.</b> Implement all type of form validations through JS
<b>CU5. Optimize web pages for maximum speed and</b>	<b>P1.</b> Test the speed of loading of pages after functional requirements achieved. <b>P2.</b> Optimize the loading page delays through refining logic and optimizing the image size , if needed



### scalability

**P3.** Localize all the scripts if loading from web like online css, js and frameworks

**P4.** Use minified version of scripting, place scripts at the end of the page to improve efficiency and speed.

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Explain different components of web pages.
- Describe the Design Layouts / mockups design process.
- Explain how to communicate the Designers to Design the mockups according to the functional and non-functional requirements,
- Understand how to balance between functional and aesthetic design
- Understand how to achieve brand consistency throughout design by identifying the fixed components of webpage and color schemes (Themes and color schemes utilization)
- Explain, how the layouts can be made more **Useful** for the end user, (Usefulness of the application is very important, if the output product is not useful, it will have no worth.
- Describe, how to make the frontend **Usable** (Usability is concerned with enabling users to effectively and efficiently achieve their end objective with a product)
- Describe, how to design the layout components **Findable** (Findable refers to the idea that the product must be easy to find and in the instance of digital and information products)
- Describe, how to make the layout **Credible** (Credibility relates to the ability of the user to trust in the product)
- Explain, how to Make the layout **Desirable** (Desirability is conveyed in design through branding, image, identity, aesthetics and emotional design.)
- Explain, how to make the application **Accessible** (Accessibility is about providing an experience which can be accessed by users of a full range of abilities)
- Explain, How to make the product **Valuable** (It must deliver value to the business which creates it and to the user who buys or uses the product.)
- Explain different types of screens sizes in pixels
- Describe the tags of HTML, List them.
- What is XHTML ? Explain



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- the the code (HTML, CSS, JS and frameworks) to generate the frontend layouts using frameworks according to mockups
- Adopt the skills to implement the right framework to achieve the responsiveness on all the screens
- Explain the CSS classes, selector types in CSS
- Explain Saas, Preprocessor, and css functions
- Explain the concept of media queries
- Explain Bootstrap and its usage
- Explain different components of bootstrap. Enlist them.
- Explain Javascript events, and actions
- Describe JS loops, objects, and DOM
- Explain Object modeling in JS
- Explain the concept of object oriented programing in JS

### **Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	IDE, editors like Notpad ++ , VSCode Editor etc
2.	Bootstrap, JQuery, HTML, CSS, Javascript
3.	Firefox, chrome, internet explorer, etc
4.	Search Engines like google
5.	Adobe photoshop, fireworks, and other designing tools

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Develop a responsive website using HTML, JS, CSS and bootstrap.
- Design a mockup according to the SRS document
- Make a form validation in JS



**0613-S&AD&A-22. Program a server side (using PHP/ASP/Python/Node JS)**

**Overview:** After this competency standard candidate will be able to perform backend development requirement by implementing code

Competency Unit	Performance Criteria
<b>CU1. Identify the architecture of web application</b>	<b>P1.</b> Compare available development technologies <b>P2.</b> Choose the suitable technology <b>P3.</b> Develop high-quality software design and architecture <b>P4.</b> Identify suitable tools for programming <b>P5.</b> Identify the scope of project <b>P6.</b> Prepare a list of tasks <b>P7.</b> Prioritize the tasks <b>P8.</b> Design the architecture
<b>CU2. Manage Resources</b>	<b>P1.</b> Identify the computing resources requirements <b>P2.</b> Make computing resource available <b>P3.</b> Install best suitable technology for development <b>P4.</b> Configure web development technology for development
<b>CU3. Develop robust application</b>	<b>P1.</b> Develop applications by producing clean, efficient code <b>P2.</b> Automate tasks through appropriate tools and scripting <b>P3.</b> Prepare Development Document
<b>CU4. Perform testing of application</b>	<b>P1.</b> Debug the code <b>P2.</b> Perform validation and verification testing <b>P3.</b> Ensure software is up-to-date with latest technologies

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Understanding of server side languages, such as Java, PHP, or Python etc.
- Strong understanding of the web development cycle and programming techniques and tools.
- How to ensure efficiency of application
- How to improve user experience?
- Define project and time Management skills



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### **Tools and Equipment**

The tools and equipment required for this competency standard are given below:

<b>S. No.</b>	<b>Items</b>
1.	Computer System with xampp installed
2.	Webserver like , Apache, Tomcat, Glassfish, etc
3.	Web Browser, Internet Connection
4.	Search Engines
5.	IDE like Netbeans, Notepad++ or visual code editor

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Architect the structure of an application through SRS
- Design ERD for application
- Integrate database with application
- Develop a CRUD application on any server side language



**0613-S&AD&A-23. Program a Database (Using SQL, MySQL, SQLite, and PostgreSQL)**

**Overview:** After this competency standard candidate will be able to

- Install Database
- Design, program, manipulate, test and Run the database
- Take backup and restore backups

Competency Unit	Performance Criteria
<b>CU1. Design the Database</b>	<p><b>P1.</b> Organize the required information</p> <p><b>P2.</b> Gather all types of information which needs to be recorded in the database</p> <p><b>P3.</b> Divide the information into tables</p> <p><b>P4.</b> Divide information items into major entities</p> <p><b>P5.</b> Covert logical design to physical design</p> <p><b>P6.</b> Turn information items into columns</p> <p><b>P7.</b> Specify primary keys</p> <p><b>P8.</b> Choose each table's primary key</p> <p><b>P9.</b> Set up the table relationships</p> <p><b>P10.</b> Analyze the design for errors.</p> <p><b>P11.</b> Apply the normalization rules</p> <p><b>P12.</b> Apply the data normalization rules to see if the tables are structured correctly</p> <p><b>P13.</b> Create database</p> <p><b>P14.</b> Create table</p> <p><b>P15.</b> Create views</p>
<b>CU2. Manipulate the Database</b>	<p><b>P1.</b> Run SELECT statement with single table</p> <p><b>P2.</b> Use SELECT statement with multiple tables using different JOINS</p> <p><b>P3.</b> Apply different SQL filters to produce organized data (e.g. HAVING, ORDER BY, GROUP BY, DISTINCT etc.)</p> <p><b>P4.</b> Run UPDATE statement to update the existing records</p> <p><b>P5.</b> Run INSERT statement to insert single or multiple records</p> <p><b>P6.</b> Run DELETE statement to delete single or multiple records</p> <p><b>P7.</b> Write store procedures</p> <p><b>P8.</b> Define/Code functions for database</p>



	<b>P9.</b> Use aggregate functions with SELECT clause
<b>CU3. Adminstrate the Database</b>	<b>P1.</b> Install database management system <b>P2.</b> Install the database servers <b>P3.</b> Develop processes for optimizing database security <b>P4.</b> Set/Maintain database standards <b>P5.</b> Manage database access controls <b>P6.</b> Install database applications <b>P7.</b> Upgrade database applications <b>P8.</b> Manage database applications <b>P9.</b> Troubleshoot database errors <b>P10.</b> Create automation for repeating database tasks <b>P11.</b> Export the database backups <b>P12.</b> Restore database backups

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Differentiate DBMS and Database
- Explain the concept of a relational database.
- Explain the relationships and its types
- Briefly Describe Early Database Models
- Explain the concept of Hierarchical Database Model
- Explain the Network Database Model
- Explain Keys and its types
- Describe the term integrity constraint
- Explain Views in Relational Database
- Describe different types of join, explain one by one
- Explain database design process
- What is the term Database Normalization?



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- How to design database through Normalization
- Explain the term ACID: Concurrency Control with Transactions
- How to ensure data integrity.
- How to get Backup of database, routine and manual
- What is DDL?
- What is DML ?
- What is DCL?
- How to implement security on database

### **Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	DBMS like MySQL, SQL / SQL Management tool, PGADMIN
2.	Database server, like mysql server, sql server etc
3.	Query Browser tools like SQL management tool, phpmyadmin, Workbench
4.	MS access
5.	Excel, and connector/driver for OS

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Prepare ERD diagram for a given scenario
- Convert Logical Design to physical design
- Design Database of eCommerce site
- Write store procedures for multiple applications



## 0613-S&AD&A-24. Perform Testing of Application

**Overview:** This competency standard will provide skills and knowledge of performing various types of Testing. After completion of this competency standard trainee will be able to perform testing of business logic, efficiency of system, user interface, unit integration and compatibility.

Competency Unit	Performance Criteria
<b>CU1. Perform User Interface Testing</b>	<b>P1.</b> Check the responsiveness of application <b>P2.</b> Check the flow of application <b>P3.</b> Check non-functional requirements
<b>CU2. Perform Unit Testing</b>	<b>P1.</b> Identify test cases for unit testing <b>P2.</b> Write test cases for unit testing <b>P3.</b> Perform unit testing using testing tools
<b>CU3. Perform integration testing</b>	<b>P1.</b> Identify scenarios for integration <b>P2.</b> Perform integration testing
<b>CU4. Perform Compatibility Testing</b>	<b>P1.</b> Test application on different desktop browsers <b>P2.</b> Test application on different mobile/devices browsers <b>P3.</b> Check compatibility tests with different operating systems
<b>CU1. Perform Security Testing</b>	<b>P1.</b> Identify the application security needs (OS,Hardware,Frameworks etc. ) <b>P2.</b> Identify all potential threats and vulnerabilities <b>P3.</b> Prepare the threat profile based on different vulnerabilities/risks <b>P4.</b> Prepare the test plan <b>P5.</b> Automate testing on top of the manual testing <b>P6.</b> Prepare the security tests case document
<b>CU1. Apply performance Testing</b>	<b>P1.</b> Select tool for performance testing <b>P2.</b> Check performance under a heavy load using selected tool <b>P3.</b> Perform Stress testing to determine the breaking point of the application

### Knowledge and Understanding

The candidate must possess underpinning knowledge and understanding required to carry out tasks covered in this competency standard. Therefore, he/she must be able to:

- Define testing and its types



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- Understand the need of testing
- Understand the user interface testing
- Understand and describe compatibility Testing
- Understand and describe the Unit testing
- Understand Unit Testing techniques
- Describe the need of Security Testing
- Describe the techniques of performance testing
- Describe the concept of automation of testing
- Define different types of testing tools

### Tools and Equipment

The tools and equipment required for this competency standard are given below:

Sr#	Items
1.	Web Security testing tools
2.	Performance testing tools
3.	Mobile/Tab
4.	Computer
5.	LCD (different screen sizes)
6.	Internet

### Critical evidence(s) Required

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Write test cases for a particular scenario
- Perform unit testing and integration testing
- Perform integration testing in virtual and real environments.
- Perform Compatibility of app under different environments.



### 0613-S&AD&A-25. Manage Project

**Overview:** After this competency standard candidate will be able to Manage

- How to assign tasks among team members
- How to divide the work tasks and execute in team
- Routine Reporting of team members
- How to achieve goals and deadlines smartly

Competency Unit	Performance Criteria
<b>CU1. Manage Project using project management Tools</b>	<b>P1.</b> Identify suitable project management tools <b>P2.</b> Install suitable project management tool <b>P3.</b> Create user accounts on tasks manager
<b>CU2. Manage Tasks using Task Management Tools</b>	<b>P1.</b> Identify tasks based on requirements <b>P2.</b> Divide the project into multiple tasks <b>P3.</b> Allocate Tasks to the team members according to the project management timeline <b>P4.</b> Set deadlines for team members <b>P5.</b> Conduct training of team members to update the status of task
<b>CU3. Monitor project</b>	<b>P1.</b> Identify milestones/deliverables <b>P2.</b> Prepare deadlines of deliverables <b>P3.</b> Prepare reports of deliverables

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes

- Explain the Project Management process
- List different project management tools
- List different Task Management tools
- How to distribute the tasks among team members
- What is meant by deadlines and how to achieve goals smartly



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**Tools and Equipment**

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Project Management software like MS project, Ganttchart
2.	Tasks Management software like Jira, Trello (cloud based), Slack
3.	Notepad, excel ,word
4.	Internet connection, search engines

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Distribute a sample project tasks on any project management tools like Ganttchart with deadlines
- Create the team members account on any task manager like Trello / Jira to assign tasks to team members
- Prepare report of activities performed by team members on tasks management tool



## B. Generic Competencies

### 5. *Entrepreneurship*

#### 0613-S&AD&A-26. **Develop entrepreneurial skills**

**Overview:** This Competency Standard identifies the competencies required to develop entrepreneurial skills by Hotel manager, in accordance with the organization’s approved guidelines and procedures. You will be expected to develop a business plan, collect information regarding revenue generation, develop a marketing plan and develop basic business communication skills. Your underpinning knowledge regarding entrepreneurial skills will be sufficient to provide you the basis for your work.

Competency Unit	Performance Criteria
<b>CU1. Develop a business plan</b>	<b>P1.</b> Conduct a market survey to collect following information <ul style="list-style-type: none"><li>• Business Model</li><li>• Financials</li><li>• Equipment Estimation</li><li>• Revenue Generation Sources</li><li>• Marketing strategy</li><li>• Market Trends</li><li>• Overall Expenses</li></ul> <b>P2.</b> Select the best option in terms of cost, service, quality, sales, operational expenses <b>P3.</b> Compile the information collected through the market survey, in the business plan format
<b>CU2. Develop a marketing plan</b>	<b>P1.</b> Make a marketing plan for the service products, price, placement, promotion, people, packaging and positioning <b>P2.</b> Include the information of marketing plan in the business plan
<b>CU3. Develop basic business communication skills</b>	<b>P1.</b> Communicate with guests using effective communication skills <b>P2.</b> Use different modes of communication to communicate effectively e.g.: presentation, speaking, writing, listening, visual representation, reading etc. <b>P3.</b> Use specific business terms used in the market

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- 7Ps of marketing including product, price, placement, promotion, people, packaging and positioning
- 7Cs of business communication
- Different modes of communication and their application in the industry
- Specific business terms used in the industry
- Available funding sources
- Low interest loans to start a new business



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- Market survey and its tools e.g. : questionnaire, interview, observation etc.,
- Market trends for specific product offering
- State the main elements of business plan
- Business plan format

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- List 7Ps of marketing
- List 7Cs of business communication



**0613-S&AD&A-27. Apply management and communication techniques**

**Overview:** This unit describes the skills and knowledge required to provide a critical link between people, ideas and information at all stages in the project life cycle. It involves assisting the project team to plan communications, communicating information related to the project, and reviewing communications. It applies to individuals who are project practitioners working in a project support role.

Competency Unit	Performance Criteria
<b>CU1. Contribute to communications planning</b>	<b>P1.</b> Identify, source and contribute relevant information requirements to initial project documentation <b>P2.</b> Contribute to developing and implementing the project communications plan and communications networks
<b>CU2. Conduct information-management activities</b>	<b>P1.</b> Act on and process project information according to agreed procedures as directed, to aid decision-making processes throughout project life cycle <b>P2.</b> Maintain information to ensure data is secure and auditable
<b>CU3. Communicate project information</b>	<b>P1.</b> Communicate with clients and other stakeholders during project using agreed networks, processes and procedures to ensure flow of necessary information <b>P2.</b> Ensure reports are prepared and released according to authorization, or produced for release by others <b>P3.</b> Seek information and advice from appropriate project authorities as required
<b>CU4. Contribute to assessing effectiveness of communication</b>	<b>P1.</b> Assist in ongoing review of project outcomes to determine effectiveness of communications-management activities <b>P2.</b> Report communications-management issues and responses to higher project authorities for application of lessons learned to future projects

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Summarize models and methods of communications management in context of project life cycle and other project management functions
- Importance of managing risk by treating information securely
- Methods of reviewing outcomes
- Organizational policies and procedures relevant to this role in a specific context.

**Critical Evidence(s) Required**



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The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Demonstrate managerial and communications plan for IoT product
- Elaborate decision-making processes throughout project life cycle



**0613-S&AD&A-28. Create human resource management plan**

**Overview:** This unit describes the skills and knowledge required to assist with aspects of human resources management of a project. It involves establishing human resource requirements, identifying the learning and development needs of people working on the project, facilitating these needs being met, and resolving conflict in the team. It applies to individuals who are project practitioners working in a project support role.

Competency Unit	Performance Criteria
<b>CU1. Assist in determining human resource requirements</b>	<p><b>P1.</b> Analyze work breakdown structure to determine human resource requirements</p> <p><b>P2.</b> Prepare a skills analysis of project personnel against project task requirements</p> <p><b>P3.</b> Assist in assigning responsibilities for achieving project deliverables</p>
<b>CU2. Contribute to establishing and maintaining productive team relationships</b>	<p><b>P1.</b> Actively seek views and opinions of team members during task planning and implementation</p> <p><b>P2.</b> Promote cooperation and effective activities, goals and relationships within team</p> <p><b>P3.</b> Communicate with others using styles and methods appropriate to organizational standards, group expectations and desired outcomes</p> <p><b>P4.</b> Communicate information and ideas to others in a logical, concise and understandable manner</p> <p><b>P5.</b> Regularly seek feedback on nature and quality of work relationships, and use feedback as basis for own improvement and development</p>
<b>CU3. Assist with human resource monitoring</b>	<p><b>P1.</b> Monitor work of project personnel against assigned roles and responsibilities within delegated authority levels</p> <p><b>P2.</b> Monitor and control actual effort against project plan</p> <p><b>P3.</b> Review skill levels against allocated tasks and recommend solutions, where required, to others</p> <p><b>P4.</b> Advise others within delegated authority when assigned responsibilities are not met by project personnel</p> <p><b>P5.</b> Undertake work in a multi-disciplinary environment according to established human resource management practices, plans, guidelines and procedures</p> <p><b>P6.</b> Resolve conflict within delegated authority according to agreed dispute-resolution processes</p> <p><b>P7.</b> Assist in offering human resource development opportunities to individuals with skill gaps</p>



**CU4. Contribute to evaluating human resource practices**

- P1.** Contribute to assessing effectiveness of project human resources management
- P2.** Document lessons learned to support continuous improvement processes

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Alternative project personnel engagement options
- Job design principles and work breakdown structures
- Learning and development approaches that can be incorporated into project life cycle
- Methods for skills analysis
- Project roles, responsibilities and reporting requirements for human resources.

**Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Produce the assigned roles and responsibilities of your team within delegated authority levels
- Provide dispute-resolution procedures for an organizations



**0613-S&AD&A-29. Develop project management plan**

**Overview:** This unit describes the skills and knowledge to develop a plan for a hotel management plan, including assessing project requirements and planning for all stages to completion and final documentation.

Competency Unit	Performance Criteria
<b>CU1. Prepare project management plan</b>	<b>P1.</b> Evaluate and assess project brief and related documents <b>P2.</b> Produce document on project tasks and associated timelines, including installation processes and test requirements <b>P3.</b> Assess and produce document on resource requirements to assist allocation of appropriate resources <b>P4.</b> Produce training plan assessing training needs and associated timelines for efficient project implementation <b>P5.</b> Determine and document budgetary requirements <b>P6.</b> Discuss roles of all identified parties associated with project to ensure their involvement <b>P7.</b> Produce project verification document, including monitoring and control processes, and review processes such as quality audits <b>P8.</b> Consult with all relevant parties prior to finalizing draft plan and make changes as appropriate
<b>CU2. Develop and evaluate management plan</b>	<b>P1.</b> Produce preliminary plan for consultation, including identified factors that may impact on realization of project and observance of relevant legislation, codes, regulation and standards <b>P2.</b> Consult with client and clarify any amendments <b>P3.</b> Develop final plan with recommendations
<b>CU3. Communicate project information</b>	<b>P1.</b> Produce and document final plan to include implementation details and training needs <b>P2.</b> Present plan to client and obtain sign off
<b>CU4. Contribute to assessing effectiveness of communication</b>	<b>P1.</b> Assist in ongoing review of project outcomes to determine effectiveness of communications-management activities <b>P2.</b> Report communications-management issues and responses to higher project authorities for application of lessons learned to future projects

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Key attributes of common telecommunications applications and related equipment



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- Evaluate the connections to carrier infrastructure or equipment
- Current legislation relating to the design of installation of telecommunications equipment and connection to carrier services
- Advantages of leasing and purchase options to assist in delivering cost effective solutions
- Evaluate network and transmission equipment
- Network topologies, and interface and interconnect solutions
- Workplace health and safety (WHS) issues that need to be built into a plan, with consideration of:
  - electrical safety
  - materials handling
  - physical hazards
  - confined spaces
  - heights
  - lifting
- Evaluate the power requirements and electrical safety aspects of the installation plan
- Performance parameters and typical faults that may be encountered in client equipment and related connection and transmission media
- Various test equipment types suitable for tests to be made
- Warranty information for equipment supplies and contractor work guarantees.

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Produce training plan assessing training needs and associated timelines for efficient project implementation
- Determine and document budgetary requirements
- Produce project verification document, including monitoring and control processes, and review processes such as quality audits
- Produce and document final plan to include implementation details and training needs
- Present plan to client and obtain sign off



**0613-S&AD&A-30. Develop sales plan**

**Overview:** This unit describes the skills and knowledge required to develop a sales plan for a product or service for a team covering a specified sales territory based on strategic objectives and in accordance with established performance targets. It applies to individuals working in a supervisory or managerial sales role who develop a sales plan for a product or service.

Competency Unit	Performance Criteria
<b>CU1. Identify organizational strategic direction</b>	<p><b>P1.</b> Obtain and analyze assessment of market needs and strategic planning documents</p> <p><b>P2.</b> Review previous sales performance and successful approaches to identify factors affecting performance</p> <p><b>P3.</b> Analyze information on market needs, new opportunities, customer profiles and requirements as a basis for decision making</p> <p><b>P4.</b> Carry out competitor analysis for rate structure</p>
<b>CU2. Establish performance targets</b>	<p><b>P1.</b> Determine practical and achievable sales targets</p> <p><b>P2.</b> Establish realistic timelines for achieving targets</p> <p><b>P3.</b> Determine measures to allow for monitoring of performance</p> <p><b>P4.</b> Ensure objectives of the sales plan and style of the campaign are consistent with organizational strategic objectives and corporate image</p>
<b>CU3. Develop a sales plan for a product</b>	<p><b>P1.</b> Determine approaches to be used to meet sales objectives</p> <p><b>P2.</b> Identify additional expertise requirements and allocate budgetary resources accordingly</p> <p><b>P3.</b> Identify risks and develop risk controls</p> <p><b>P4.</b> Develop advertising and promotional strategy for product</p> <p><b>P5.</b> Identify appropriate distribution channels for product</p> <p><b>P6.</b> Prepare a budget for the sales plan</p> <p><b>P7.</b> Present documented sales plan to appropriate personnel for approval</p>
<b>CU4. Identify support requirements</b>	<p><b>P1.</b> Identify and acquire staff resources to implement sales plan</p> <p><b>P2.</b> Develop an appropriate selling approach</p> <p><b>P3.</b> Train staff in the selling approach selected</p> <p><b>P4.</b> Develop and assess staff knowledge of product to be sold</p>
<b>CU5. Monitor and review sales plan</b>	<p><b>P1.</b> Monitor implementation of the sales plan</p> <p><b>P2.</b> Record data measuring performance versus sales targets</p> <p><b>P3.</b> Make adjustments to sales plan as required to ensure required results are obtained</p>

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:



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- Outline principles and techniques for selling
- Outline methods for monitoring sales outcomes
- Statistical techniques for analyzing sales and market trends
- Internal and external sources of information that are relevant to identifying organizational strategic direction and developing a product sales plan.
- Competitors intelligence

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Identify the risks of the product i.e., sale/deployments
- Produce a sales plan for the product
- Demonstrate marketing and selling approach
- Demonstrate advertising and promotional strategy for product



**0613-S&AD&A-31. Conduct research for customer needs and satisfaction**

**Overview:** This unit describes the skills and knowledge required to manage an ongoing relationship with a customer over a period of time. This includes helping customers articulate their needs and managing networks to ensure customer needs are addressed. It applies to individuals who are expected to have detailed product knowledge in order to recommend customized solutions. In this role, individuals would be expected to apply organizational procedures and be aware of, and apply as appropriate, broader factors involving ethics, industry practice and relevant government policies and regulations.

Competency Unit	Performance Criteria
<b>CU1. Assist customer to articulate needs</b>	<b>P1.</b> Ensure customer needs are fully explored, understood and agreed <b>P2.</b> Explain and match available services and products to customer needs <b>P3.</b> Identify and communicate rights and responsibilities of customers to the customer as appropriate
<b>CU2. Satisfy complex customer needs</b>	<b>P1.</b> Explain possibilities for meeting customer needs <b>P2.</b> Assist customers to evaluate service and/or product options to satisfy their needs <b>P3.</b> Determine and prioritize preferred actions <b>P4.</b> Identify potential areas of difficulty in customer service delivery and take appropriate actions in a positive manner
<b>CU3. Manage networks to ensure customer needs are addressed</b>	<b>P1.</b> Establish effective regular communication with customers <b>P2.</b> Establish, maintain and expand relevant networks to ensure appropriate referral of customers to products and services from within and outside the organization <b>P3.</b> Ensure procedures are in place to ensure that decisions about targeting of customer services are based on up-to-date information about the customer and the products and services available <b>P4.</b> Ensure procedures are put in place to ensure that referrals are based on the matching of the assessment of customer needs and availability of products and services <b>P5.</b> Maintain records of customer interaction in accordance with organizational procedures
<b>CU4. Convert customer enquiries into sales</b>	<b>P1.</b> Use information provided by customers or accessed from the customer relationship management (CRM) system to identify any needs <b>P2.</b> Identify suitable products/services to meet needs <b>P3.</b> Make convincing sales pitches to customers following standard scripts <b>P4.</b> Handle customer queries, objections and rebuttals following standard scripts <b>P5.</b> Adapt your approach and style to customer preferences, within



the limits of your competence and authority

**P6.** Refer issues outside your area of competence and authority to appropriate people, following your organization’s procedures

**P7.** Identify and act on opportunities to up-sell or cross-sell other products/services to customers

**P8.** Confirm customer wishes and needs in order to close sales

**P9.** Obtain required financial information from customers, following your organization’s procedures

**P10.** Complete your organization’s post-sales procedures in order to complete/ fulfill sales

**P11.** Comply with relevant standards, policies, procedures and guidelines when converting customer enquiries into sales

### **Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Organizational procedures and standards for establishing and maintaining customer service relationships
- Consumer rights and responsibilities
- Ways to establish effective regular communication with customers
  - Outline details of products or services including with reference to:
  - possible alternative products and services
  - Variations within a limited product and service range

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Gather customer needs and requirements
- Analyse customer needs and requirements
- Enlist communication rights and responsibilities of customers
- Handle customer relationship management (CRM) model to identify suitable products/services to meet customer needs



**0613-S&AD&A-32. Manage finances**

**Overview:** This unit of competency describes the outcomes required to develop, implement and monitor a personal budget in order to plan regular savings and manage debt effectively.

Competency Unit	Performance Criteria
<b>CU1. Develop a personal budget</b>	<p><b>P1.</b> Calculate current living expenses using available information to prepare a personal budget.</p> <p><b>P2.</b> Keep a record of all income and expenses for a short period of time to help estimate ongoing expenses.</p> <p><b>P3.</b> Subtract total expenses from total income to determine a surplus or deficit budget for the specified period.</p> <p><b>P4.</b> Find reasons for a deficit budget and ways to reduce expenditure identified.</p> <p><b>P5.</b> Identify ways to increase income, if possible</p>
<b>CU2. Develop longer term personal budget</b>	<p><b>P1.</b> Analyze income and expenditure and set longer term personal, work and financial goals.</p> <p><b>P2.</b> Develop a longer-term budget based on the outcomes of short-term budgeting, and adjust to meet living, work and future career requirements.</p> <p><b>P3.</b> Identify obstacles that might affect finances such as job loss, sickness or unexpected expenses contingency savings</p> <p><b>P4.</b> Formulate a regular savings plan based on budget, using secure savings products and services.</p> <p><b>P5.</b> Monitor expenditure against budget and identify areas of possible expenditure saving</p>
<b>CU3. Identify ways to maximize future finances</b>	<p><b>P1.</b> Determine sources and ways to maximize personal income, including from work, investments or available government payments/allowances.</p> <p><b>P2.</b> Get further education or training to maintain or improve future income.</p> <p><b>P3.</b> Identify the need for debt to finance living and other expenses, and determine the appropriate levels of debt and repayment.</p> <p><b>P4.</b> Consolidate existing debt, where possible, to minimize interest costs and fees.</p> <p><b>P5.</b> Seek professional money management services, where available, to ensure financial plans are effective and achievable</p>

**Knowledge & Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Abilities to plan and organize to keep records and monitor a personal budget
- Abilities to set and review goals



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- Basic financial management and record keeping to enable development and management of a personal budget
- Benefits of financial goal setting and personal budgeting to enable effective management of personal finances
- Numeracy skills to compare income and expenditure

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Produce a longer-term budget based on the outcomes of short-term budgeting
- Develop and report the need for debt to finance living and other expenses,
- Determine the appropriate levels of debt and repayment
- Demonstrate the ways to increase finances and income



**0613-S&AD&A-33. Identify and resolve problems**

**Overview:**

This unit is focus on negotiation in critical incidents and the development of strategic responses designed to resolve threatening incidents.

Competency Unit	Performance Criteria
<b>CU1. Identify a problem</b>	<p><b>P1.</b> Form a problem statement and analyze root cause.</p> <p><b>P2.</b> Take initiative in tackling problems rather than relying solely on directives</p> <p><b>P3.</b> Follow logic steps in understanding root cause and analyzing potential solutions.</p>
<b>CU2. Determine strategies for a required solution</b>	<p><b>P1.</b> Analyze all aspects of the incident for degree of hazard, priorities, optional outcomes and appropriate strategies</p> <p><b>P2.</b> Analyze and determine strategies and priorities on the incident sought from a range of sources</p> <p><b>P3.</b> Assess long term objectives against resources and priorities</p> <p><b>P4.</b> Apply a range of communication techniques to make and maintain contact with the key people</p> <p><b>P5.</b> Provide clear and factual information to enable an honest and realistic assessment of the interests of the key people and their positions</p> <p><b>P6.</b> Resolve the conflict and express their likely consequences clearly and do an analysis of the benefits</p> <p><b>P7.</b> Reassess points of disagreements for common positive Positions</p>
<b>CU3. Coordinate support services</b>	<p><b>P1.</b> Assess the need for support services in terms of the determined strategies and priorities</p> <p><b>P2.</b> Negotiate the resources of support services according to established procedures and availability</p> <p><b>P3.</b> Provide information on strategies to support services and maintain the communication</p> <p><b>P4.</b> Delegate roles and responsibilities according to expertise and resources</p>
<b>CU5. Restore order</b>	<p><b>P1.</b> Assess the incidents for degree of risk and take appropriate action to reduce and remove the impact of the incident and restore order</p> <p><b>P2.</b> Take action designed to minimize risk and the preserve the safety and security of all involved</p> <p><b>P3.</b> Take action to prevent the escalation of the incident appropriate to the circumstances and agreed procedures.</p> <p><b>P4.</b> Carry out the use of force for the restoration of control and the maintenance of security in the least restrictive manner.</p> <p><b>P5.</b> Complete reports accurately and clearly provided to the</p>



	appropriate authority promptly <b>P6</b> .Review, evaluate and analyze the incident and the organizational response to it and report it promptly and accurately.
<b>CU6. Provide leadership. direction and guidance to the work group</b>	<b>P1</b> .Link between the function of the group and the goals of the organization <b>P2</b> .Participate in decision making routinely to develop, implement and review work of the group and to allocate responsibilities where appropriate <b>P3</b> .Give opportunities and encouragement to others to develop new and innovative work practices and strategies <b>P4</b> .Identify conflict and resolve with minimum disruption to work group function <b>P5</b> .Provide staff with the support and supervision necessary to perform work safely and without risk to health <b>P6</b> .Allocate tasks within the competence of staff and support with appropriate authority, autonomy and training <b>P7</b> .Supervise appropriately the changing priorities and situations and takes into account the different needs of individuals and the requirements of the task

### Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Organization's policies, guidelines and procedures related to control and surveillance, safety and preventing and responding to incidents and breaches of orders covered in the range of variables.
- Organization's management and accountability systems
- Teamwork principles and strategies
- Principles of effective communication
- Guidelines for use of equipment and technology
- Code of conduct

### **Critical Evidence(s) Required**

The candidate needs to produce following **Critical Evidence(s)** in order to be competent in this competency standard:

- Identify problem statement
- Build team



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- Identify your target community for the proposed product/solution
- Analyze product sale and marketing plan
- Provide your strategy to execute entrepreneurial plan
- Provide three solutions (A, B, C) of your business plan
- Present complete portfolio of entrepreneurial plan as an evidence
- Provide clear and factual information to enable an honest and realistic assessment of the interests of the key people and their positions
- Provide information on strategies to support after sale services
- Provide a complete entrepreneurial plan



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