**Task 1: Game Engines**

2D Game Engines

Unity 2D:

* Tilemap which enables to create levels efficiently.
* It is supported on a variety of Operating Systems including iOS, Android, Windows Phone, Tizen, and Fire OS.
* Sorting Group Component which keeps your workplace organised and provides the ability to render a set of objects separately from others on the same Sorting Layer.
* Supports C# programming language
* Outline Editor which allows the user to Edit an outline of a generated sprite in the Sprite Editor Window.

Godot Engine 2D:

* Free and open source game engine
* Supports C#, GDScript, C++ and additional language like Phyton whic are provided by the community.
* Works on Windows, macOS, Linux, FreeBSD, OpenBSD ,Haiku ,iOS, Android. It is very easy to compile on any platform
* Integrated documentation which allows you to browse the whole API offline
* Friendly filesystem usage that works great with version control systems like Git, Subversion, Mercurial, PlasticSCM and Perforce.

Stencyl :

* Publishes games for iPhone, iPad, Android, Windows, Mac, Linux, HTML5 & Flash .
* Beginner friendly as it doesnt use code to work but a drag and drop feature
* Has graphic editors which feel familiar to Photoshop and GIMP.
* Uses Cloud to save its work which can be set to private or public mode.
* Has a Tileset Editor which is used to import and edit tilesets.

Construct :

* Exports platforms are HTML5 based and it supports Google Chrome, Firefox, Internet Explorer 9+, Safari 6+ and Opera 15+ ,Safari in iOS 6+, Windows Phone 8+, BlackBerry 10+ and Tizen.
* It supports JavaScript as a language.
* Primary method of programming games is through event sheets which is beginner-friendly.
* It is Open Source
* It is can produce games which are compatible with the Nintendo Wii U and the Xbox One.

3D Engines:

Unreal Engine 4

* Has a massive Rendering and Graphics support system including Fog effects, Sky atmosphere , Virtual Texturing, Rendering Overview and dynamic resolution.
* Skeletal Mesh Animation System which is used for deforming skeletal meshes based on keyframed animation data and morph targets.
* Sequncer Editor is used for creating and previewing cinematic sequnces in real time
* Chaos destruction and physics simulation to calculate collision and simulate physical actors.
* A system for Artificial Intelligens and a lot of built in pluugins.

CryEngine

* Visuals which include DirectX 12 Support, 3D HDR lens flares , Real Time Local Reflections , Area Lights and HDR filmic tone Maps.
* Has a sandbox engine which has a material editor, a flowgraph , Support for FBx and substance integration
* Its AI and Animation include Character Technology ,Parametric Skeletal, AnimationGeometry ,Cache,Multi-Layer Navigation Mesh,Advanced AI System, Physicalized Character Customization, Procedural Motion-Warping & High-End IK Solutions
* Includes In-Game Profiling , Statoscope and Data Driven thread managment.
* Has an advanced physics engine which includes Vegetaion touch blending and various destruction modles

Neoaxis

* Free and open source and works on Windows and Mac OSX
* Supports C# , Visual studio and .Net Api
* Scene editor.
* GUI editor.
* Import tools and Mesh tools

Source Engine

* Advanced Shader Technology
* Dynamic Lighting and Shadows
* Full Range of Special Effects . Including particles, beams, volumetric smoke, sparks, blood and environmental effects like fog and rain.
* Advanced Character Meshes which help create believable characters with accurate human characteristics.
* Advanced Animation Tools which can include Skeletal Animation System and a Facial Animation System.

Task 2 Gaming Programming Languages

Java

1. Used in Web applications, Mobile and Embedded systems
2. Has a cross platform cability (“write once, run anywhere.”)

Phyton

1. Used in Web Apps and AI
2. It’s very popular for General Purpose programming

C++

1. Used in Local Applications, Web Services and Proprietary Services
2. Complex to learn but rewarding

C#

1. Used in Local Applications, Web Services and Proprietary Services
2. Doesnt occupy system performance and is easy to run

PHP

1. Used in web applications
2. Easy to learn and is the basis for most web applications

JavaScript

1. Used in web applications and local applications
2. Can be combined with HTML to make cross platform mobile apps

Sql

1. Used in Database queries
2. Is a domain-specific language.

Task 3: Compression in multimedia

a)

Compression is useful because it helps reduce the consumption of expensive resources, such as hard disk space or transmission bandwidth. On the downside, compressed data must be decompressed to be used, and this extra processing may be detrimental to some applications.

For instance, a compression scheme for video may require expensive hardware for the video to be decompressed fast enough to be viewed as it is being decompressed (the option of decompressing the video in full before watching it may be inconvenient, and requires storage space for the decompressed video).

b)

Still image compression begins by dividing the image into pixel by pixel blocks. The main processing steps that follow are transformation to the frequncy fomain. Quantization of the frequency fomain coefficients, run-length coding of the co efficients and variable length coding. Still iamge decompression then reverses these steps.

