**COMSATS University Islamabad, Lahore Campus**



**Terminal Examination– FALL 2020**

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| Course Title: | Game Development | | | | Course Code: | | CSC 303 | Credit Hours: | 3(2,1) |
| Course Instructor/s: | M. Mohsin Mehdi | | | | Programme Name: | | BS Computer Science | | |
| Semester: | 6th | Batch: | SP18 | Section: | A, B, C | | Date: |  | |
| **Time Allowed:** | **180 Minutes** | | | | **Maximum Marks:** | | | **75** | |
| Student’s Name: |  | | | | Reg. No. | SP18-BSE-126 | | | |
| **Important Instructions / Guidelines:**   * Avoid overwriting and cutting. * Read the questions carefully. * Try to attempt the questions in order. If not mark the questions properly. | | | | | | | | | |

**Question 1: [5 marks]**

Write the fragment of code that allows the continuous movement of the pendulum. The amplitude of pendulum can be set to 5 on both sides. Consider the pendulum’s mean position at the origin (0,0).

For the fixed movement the code is using fixed delta time for the time variable manipulation and after that the key phase is used to keep the pendulum between the 0-5 phase the switch cases are used to set the timer and define the motion of the pendulum by adjusting the speed of the pendulum

public class PendulumMovement : MonoBehaviour

{

float timer\_pendulum = 0f;

float speed\_pendulum = 1f;

int phaseshift = 0;

void FixedUpdate()

{

Timer\_pendulum += Time.fixedDeltaTime;

if(timer\_pendulum >1f)

{

phaseshift ++;

phaseshift %= 6;

timer = 0f;

} switch(phaseshift)

case 0:

transform.Rotate(0f, 0f, speed \* (1 - timer));

break;

case 1:

transform.Rotate(0f, 0f, -speed \* timer);

break;

case 2:

transform.Rotate(0f, 0f, -speed \* (1 - timer));

break;

case 3:

transform.Rotate(0f, 0f, speed \* timer);

break;

}

}

}

**Question 2: [10 marks]**

Write a detailed note on GameObject arrays. Describe 3 different scenarios where GameObject array is an efficient choice to use.

**Answer**

**Gameobject array**

Gameobject array is used to declare the same kind of objects which have same categories. They specification is same kind of altogether. We can place of all of them in a array and easily apply the function and any instruction,

GameObject arrays, are made to be hold all the data as of same type, we create GameObject arrays whenever we must create multiple objects of same types in the game. Sometime they have same function to perform in the game

GameObject[ ] carsInTheScene = GameObject.FindGameObjectsWithTag("car");

**Example**

In smashing game, we have assigned game object bricks which are similar kinds of itself. We can change them easily as we want them to do. That can easily destroy all.

In different game we have similar kinds of guns, we can make gameobject array of them. We can easily assign them properties

In racing as our project we gave gameobject to all smilar cars so they belong to same caterogy and have same properties

**Question 3: [15 marks]**

Consider a scenario where two randomly moving cubes in a 3-D space are set to go anywhere but within absolute distance of 5 of each other. This will exclude the possibility of collision between them. How you will make sure both cubes do not violate the condition of absolute distance. Write your answer in detail supported with snaps of required lines of code.

Answer’

We have save the transform of the target in a variable of game. In every frame of game we check if the two bodies are more than 5 units apart from each other. If they are apart, we move them closer. This can be done as follows.

We take the difference vector of two positions of bodies, normalize it and multiply it by both of them by 5. This gives us the same difference vector, but with a magnitude that is tolerable. Then we move the body to that position with respect to the target.

void Update(){

if(Vector3.Distance(target.position, transform.position) > 5){

Vector3 pos = target.position - transform.position;

Vector3 offset = pos.normalized()\*5;

transform.position = target.position + offset;

**Question 4: [5+5+5 = 15 Marks]**

Consider the FPS game you have developed so far. Answer the following questions regarding Ammo.

1. Use of Ammo depends upon the number of shots fired. How you will make sure that Ammo only decreases if the shot is misfired (means it does not hit the target). Explain with the help of code.

RaycastHit ammoShot;

if (Input.GetButtonDown("gunFire1"))

{

if (Physics.Raycast(transform.position, transform.TransformDirection(Vector3.forward), out Shot))

{

Target = Shot. GameObject.FindGameObjectsWithTag(“enemy”);

if (Target!= "opponent")

{

GlobalAmmo.CurrentAmmo -= 1;

}

}

}

1. Consider you have a backup Ammo. It will only be used if the original Ammo runs out. The backup ammo will only reload if the original ammo is full. Otherwise the remaining bullets will come to the backup Ammo. For example, if bullet reload is 10 and upon reloading if original Ammo is on 10 then backup Ammo will become 10. If original Ammo is 6, upon reloading the original Ammo will become 10 and backup Ammo will become 6. Write the code of this reloading mechanism.

public class Loot : MonoBehaviour

{

public void OnTriggerEnter(Collider other)

{

if(GlobalAmmo.currentAmmo == 10)

GlobalAmmo.backupAmmo += 10;

else if(GlobalAmmo.currentAmmo < 10)

{

GlobalAmmo.backupAmmo = GlobalAmmo.currentAmmo;

GlobalAmmo.currentAmmo = 10;

}

}

}

1. If both Ammo’s are empty then the player must hit a hot key to load Ammo. The hot key is “Up Up Down W w R t”. How this hotkey press will be detected and applied.

**Answer:**

If both of ammos are empty then user will press the keys which are have specified to them for that function, these will be detected using the function used in unity to do such type of function Input.GetKeyDown("specified key") as it written in update part of the script

If these conditions arranged for the specified in the sequence and if the user fulfills all the necessary conditions i-e presses the desired input, then the ammo will be reloaded

The hot key press will be detected and applied as String keys = [“U”]

if (Input.GetKeyDown(KeyCode.UpArrow))

if (Input.GetKeyDown(KeyCode.UpArrow))

if (Input.GetKeyDown(KeyCode.DownArrow))

if (Input.GetKeyDown(KeyCode.W))

if (Input.GetKeyDown(KeyCode.w))

if (Input.GetKeyDown(KeyCode.R))

if (Input.GetKeyDown(KeyCode.t))

{

GlobalAmmo.CurrentAmmo = 10;

}

**Question 5. [5+5 = 10 marks]**

Simulate rotation and revolution of a sphere?

**Rotation and Revolution**

Rotation is the movement in which the object moves around its axis while the rotation is movement of object about a fixed position

Public class sphereOscillator: MonoBehaviour {

Float: TimeCount=0;

Void Start() { }

Void Update() {

Timecount += time.deltatime()

Float a= mathf.cos(timeCount);

Float b= mathf.sin(timeCount);

Float c=0;

Transform.position=newVector3(a,b,c);

}

Rotation:

transform.Rotate((Vector3(0.0f, 0.0f, -10.0f) \* Time.deltaTime), Space.Self);

**Question 6. [5 marks]**

What is the difference between transformation and animation?

**Answe**r

**transformation**

Transformation is used when we want to change the direction and position of object. In transformation we have axis and scale which can change the size, position, rotation according to our need. We can easily change them on side there is inspector available which can help us to change the values.

**Animation**

animation is used to move and take control of the text and object in the unity.it is defined as transformation of object from one stage to another. We can apply different feature and specification with the help of the animation. We can move the object on the screen. Whereas in text form we can apply different transition to it

**Question 7. [15 marks]**

Consider you are to simulate a tank’s fire. Tank’s fire is a parabola. It depends upon the angle of the gun. The angle of gun is set in order to cover the distance of the target which depends upon the weight of the fireball. Write the equation in C# unity form to show such a hit. Since weight management of the GameObject was not a part of the course, let’s consider the weight at 1 and at 45 degrees the distance covered is 100 along axis and maximum height achieved is 20 along y-axis.

Answer

Using Velocity = u and Max Height H

h = uy2 / 2g

uy = sqrt(2gh)

Using Range = R

R = u\*sin(theta) \* u\* cos(theta)/g

ux = Rg/uy

float H = 20.0f;

float R = 100.0f;

float angle = 45;

public GameObject bulletPrefab;

public Transform spawnPosition;

void Fire(){

float y = Mathf.sqrt(2\*10\*H);

float x = R\*10/y;

Vector3 initVelocity = new Vector2(x, y, 0);

GameObject bullet = Instantiate(bulletPrefab, spawnPosition);

bullet.transform.SetVeloctity(initVelocity);

}