National University of Computer and Emerging Sciences

Department of Computer Science **Chiniot-Faisalabad Campus**

QUIZ 2 (1B)

Name..... **Roll no.** ..... **Date** .....

Semester ..... **Class** ..... **Section**.....

Instructions:

- **Attempt all questions.**
- **Show all steps clearly.**
- **Direct answers without steps will result in mark deductions.**

Q1. A projectile is fired upward at an angle above the horizontal with an initial speed At its maximum height, what are its velocity vector, its speed, and its acceleration vector? [4 Marks]

Sol= v_x = constant $v_y = 0$

$v = v_x \Rightarrow |v| = v_x$

$a_x = 0$ $a_y = -g$

Q2. A football is kicked at 37.0° to the horizontal at 20.0 m/s from the player's hand at 1.00 m from the ground. How far did the football travel before hitting the ground? [6 Marks]

The same football is kicked from the ground instead.

a) Find the maximum height.
b) Find the time of travel.
c) How far away does it hit the ground?

Sol= $v_i = 20$ m/s $y_i = 1.00$m

$\theta = 37°$

$y - y_i = v_i \sin\theta\, t - \frac{1}{2} g t^2$

$0 - 1 = 20\sin(37)(t) - \frac{1}{2}(9.8)t^2$

$4.9t^2 - 12.03t - 1 = 0$

$t = 12.03 \pm \sqrt{(12.03)^2 + 4(4.9)(1)}$

$= 2.54$ secs

$X = v_{ix} t \Rightarrow 20\cos(37°)(2.54)$

$= 40.57$m

a) $H = \frac{v_i^2 \sin^2\theta}{2g}$

$= \frac{(20)^2(\sin 37)^2}{2(9.8)}$

$= 7.39$m

b) $t = \frac{2 v_i \sin\theta}{g}$

$= \frac{2(20)(\sin 37)}{9.8}$

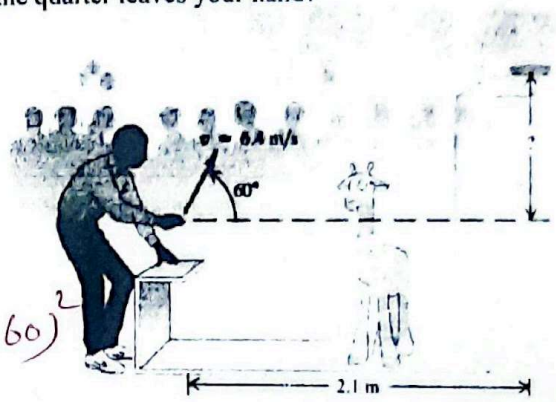
$= 2.45$ secs

c) Sol= $R = \frac{v_i^2 \sin 2\theta}{g}$

$= 39.23$m

Q3. In a carnival booth, you can win a stuffed giraffe if you toss a quarter into a small dish. The dish is on a shelf above the point where the quarter leaves your hand and is a horizontal distance of 2.1 m from this point toss the coin with a velocity of 6.4 m/s at an angle of 60 above the horizontal, the coin will land in the dish. Ignore air resistance. [6 Marks]

(a) What is the height of the shelf above the point where the quarter leaves your hand?



sol:- $v = 6.4\ m/s \quad x = 2.1\ m$

$\theta = 60^\circ \quad y = ?$

$$y = x\tan\theta - \frac{gx^2}{2v_i^2\cos^2\theta}$$

$$y = (2.1)\tan(60^\circ) - \frac{9.8(2.1)^2}{2(6.4)^2(\cos 60)^2}$$

$$= 1.53m$$

OR

$$x = v_{ix}\,t$$

$$\frac{x}{v_{ix}} = t$$

$$t = \frac{2.1}{(6.4)(\cos 60)} \Rightarrow 0.656 secs$$

$$y = v_i \sin\theta t - \frac{1}{2}gt^2$$

$$y = (6.4)(\sin 60)(0.656) - \frac{1}{2}(9.8)(0.656)^2$$

$$= 1.53$$

(b) What is the vertical component of the velocity of the quarter just before it lands in the dish?

$$v_{fy} = v_i \sin\theta - gt$$

$$= (6.4)(\sin 60^\circ) - (9.8)(0.656)$$

$$= -0.886\,\hat{j}\ m/s$$