National University of Computer and Emerging Sciences

Applied Physics (NS-1001)

Sessional-I Exam

Date: March 26th , 2024

Course Instructor

Semester: SP-2024

Dept: School of Computing

Total Time: 1 Hour

Total Marks: 30

Total Questions: 04

Campus: Karachi

Student Name	Roll No	Section	Student Signature

CLO # 1 Vectors

Q1: Answer the following: **[08]**

a. A centripetal-acceleration addict rides in uniform circular motion with radius r=3 m. At one instant his acceleration is a=(600m/s²)i +(−4m/s²)j.
At that instant, what are the values of (a) v.a and (b) r.a [3]

b. The three vectors in Fig-1 have magnitudes a = 4 m, b = 6 m, and c = 12 m and angle θ = 30°. Find the resultant vector, magnitude of resultant vector, and angle. [3]

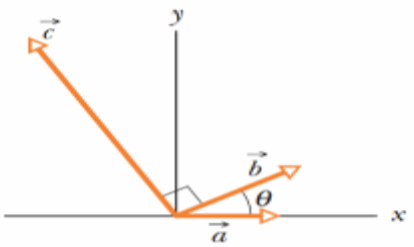

Fig-1

c. Find the area of the parallelogram with adjacent sides **A = 3i - 2j + 4k** and **B = -i - 4j + 2k.** [2]

CLO # 2 Linear Motion

Q2: Answer the following: **[08]**

a. A particle initially has v = 3i−5j+2k and then 4.0 s later has v = -13i−2j+9k (in meters per second). For that 5sec, what are (a) the particle average acceleration a_{avg} in unit vector notation, (b) the magnitude of a_{avg}, and (c) the angle between a_{avg} and the positive direction of

the y axis?

[2]

b. Point out the two motion characteristics which are true of free-falling objects. [2]

c. Fig-2 depicts the motion of a particle moving along an *x* axis with a constant acceleration. The figure's vertical scaling is set by *xs=7.5*0 m. What are the (a) magnitude and (b) direction of the particle's acceleration?

[2]

d. With the help of the following Position – time graph, draw velocity versus time (v vs t) and acceleration versus time (a vs t) graphs for Fig-3. [2]

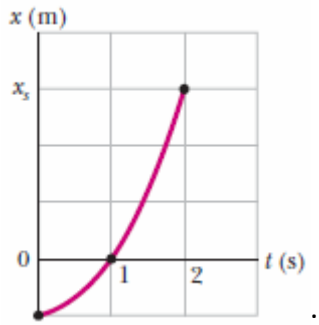

Fig-2

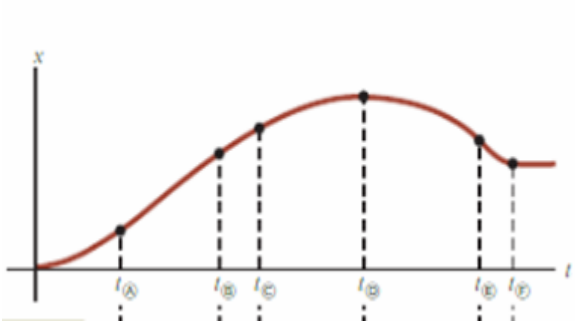

Fig-3

CLO # 3 Projectile_Motions

Q3: Answer the following: **[04]**

(a) A ball is thrown horizontally from the top of a building that is 20 meters tall. The initial velocity of the ball is 15 m/s. Determine: (i) How long does it take for the ball to hit the ground? (ii) What is the horizontal range of the ba

[4]

CLO # 4 Forces

Q4: Answer the following: **[10]**

a. Two blocks of mass 5 kg and 9 kg are connected by a string of negligible mass that passes over a frictionless pulley (Fig-5). The inclines are frictionless. Find (a) the magnitude of the acceleration of each block and (b) the tension in the string. Take g = 10 ms^{-2}. [5]

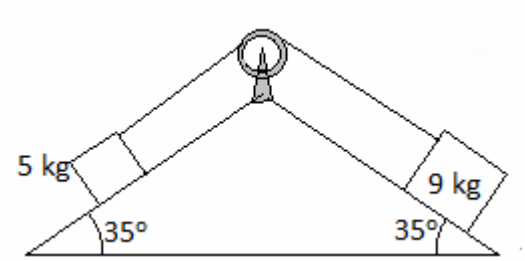

Fig-5

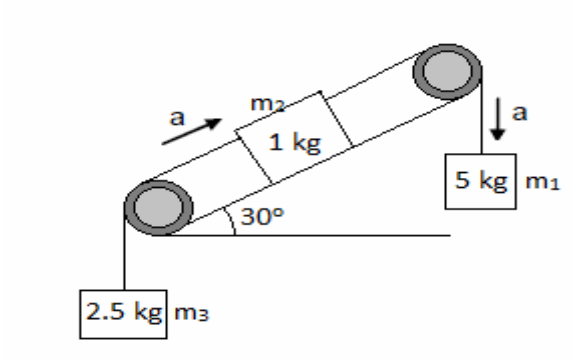

Fig-6

b. Draw a free body diagram for Fig-6 and write down the equation of Forces. The incline has friction. [3]

c. In team sports like football or soccer, how can players apply Newton's laws to optimize their movements and strategies during a game? [2]