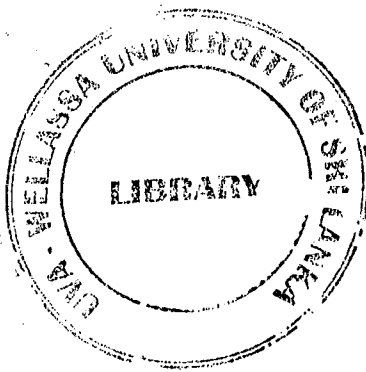
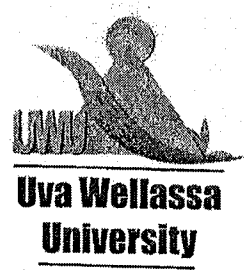




Uva Wellassa University, Sri Lanka
Faculty of Science and Technology
Science and Technology Degree program
1st Semester Examination – March/ April 2013



SCT 151-1
Physics I

Number of questions: Four (04)
Answer all the questions
Time allocation: One (01) hour
Total marks allocated: 100

01. By seeing a child on the railway track the driver applies brake. The speed of the train is reduced from 25 ms^{-1} to 10 ms^{-1} in 5 s. Assume the deceleration of the train is uniform.
- a. Calculate the deceleration of the train. (6 marks)
 - b. What is the distance travelled by the train during this time interval? (9 marks)
 - c. Calculate the time for the train to become the rest from 25 ms^{-1} . (10 marks)

02. a. For any two vectors $\vec{A}$ and $\vec{B}$ with angle θ , the magnitudes of scalar and vector products are $|\vec{A} \cdot \vec{B}|$ and $|\vec{A} \times \vec{B}|$. Show that

$$|\vec{A} \cdot \vec{B}|^2 + |\vec{A} \times \vec{B}|^2 = A^2 B^2$$

(8 marks)

- b. i. Define Curl and Divergence of a vector. (8 marks)
- ii. If $\vec{A}$ is any vector, show that $\nabla \cdot (\nabla \times \vec{A}) = 0$ (9 marks)

03. a. i. Write down an expression for the potential at the surface of a conducting sphere of radius R and charge Q .
(4 marks)
- ii. Calculate the charge on a conducting sphere of diameter 100mm when the potential of the sphere is 1.8 kV.
(4 marks)
- b. An uncharged spherical conducting sphere is placed in the region between two charged plates as shown in the Figure Q3.

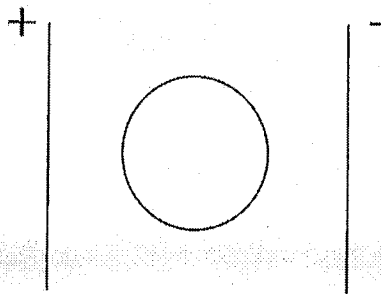


Figure Q3

- i. State the nature of the electric field inside the sphere.
(6 marks)
- ii. Copy the diagram.
a) Show the distribution of charge on the sphere.
(5marks)
- b) Sketch the electric field between the plates.
(6 marks)
04. State the followings.
- Newton's laws of motion
 - Momentum Conservation
 - Energy Conservation
 - Flemings Left hand rule
 - Gauss Law

(5 x 5 = 25 marks)