EASTERN UNIVERSITY, SRI LANKA

FIRST EXAMINATION IN SCIENCE – 2016/2017

FIRST SEMESTER - **Repeat** (August / September 2018)

PH 101 MECHANICS I

me : 01 hour

nswer ALL Questions

(a) Briefly explain the *Conservative force, Work done*, and *Work-Energy* principle in Physics.

(b) A particle is moving with a velocity $v(t)$ under the influence of an external force $F(t)$. Show that the work done W by the force between the time interval t_1 to t_2 is,

$$W = \int_{t_1}^{t_2} (\vec{F} \cdot \vec{v})\, dt,$$

(c) A particle of mass 10 Kg moves with an initial velocity $(5i - 2k)$ ms^{-1} under the influence of an external force $\vec{F} = 1i + 2j + 3k$ N with the usual notations. Find the followings,

(i) power of the force at any time *t* sec.

(ii) work done by the force in the time interval between 0 to 20 sec.

(iii) velocity and the position vector of the particle when t = 20 sec.

(iv) kinetic energy of the particle when t = 20 sec and verify your answer by considering the relationship between work and energy.

(a) Briefly explain the meaning of *elastic* and *inelastic* collisions in the particle motion.

(b) Consider an elastic head-on collision between two bodies and show that the relative velocities of the bodies before and after the collision is equal.

(c) A 3 kg ball moving with the velocity of 10 ms^{-1} head-on collision with a 5 kg ball moving in the opposite direction with the velocity of 20 ms^{-1}. Find the velocity of each balls after the collision for following each conditions, if

(i) the elastic constant e = $\frac{5}{6}$

(ii) the balls stick together, and

(iii) the collision is perfectly elastic.