(Please write your Enrollment Number)

Enrollment No. 03501032016

MINOR - II EXAMINATION
(November-2016)

Subject Code: BAS-103	Subject: Applied Physics-I
Time : 1 ½ Hours	Maximum Marks : 30

Note: Q. 1 is compulsory. Attempt any two questions from the rest.

Q1. Attempt any five parts. (2x5=10)

(a) Calculate the speed of a particle if its total energy is thrice of its rest mass energy.

(b) Calculate the magnitude of Poynting vector at the surface of Sun. Given the power radiated by Sun is 3.8×10^{26} Watt and radius of Sun is 7×10^{8}m.

(c) What is Minkowiski space-time interval? Define time-like, space-like and light-like events.

(d) What are basic postulates of special theory of relativity?

(e) Write the expression for Poynting theorem, giving the physical significance of each term.

(f) Find the skin depth for an electromagnetic wave of frequency 71.56 MHz in a medium where $\mu_r=\xi_r=1$ and conductivity= 3.54×10^{7} mho/m.

Q2. (5,5)

(a) Assuming that all the energy from a 1000W lamp is radiated uniformly in free space; calculate the values of Intensities of electric and magnetic fields of radiation at a distance of 2m from the lamp. An electromagnetic wave with $\vec{E} = 20\sin[10^8 t - kz]\hat{j}$ V/m is propagating in free space. Find the magnetic field $\vec{H}$.

(b) Write the differential and integral forms of Maxwell's equations and state physical significance of each.

Q3. (5,5)

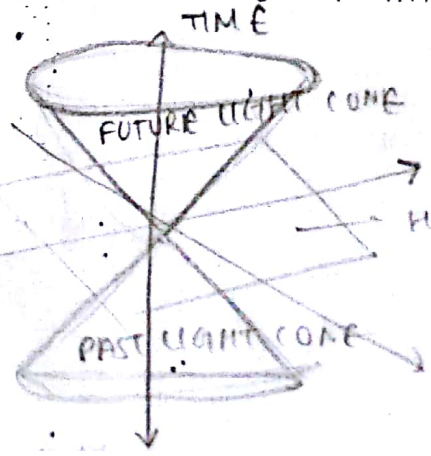
(a) A μ meson has a half life of 2.0μs. If it is travelling with a speed of 2.998×10^{8}m/s, how far will it travel? If relativistic effects are not taken into account, how far will it travel? Write the relation between relativistic energy and momentum.

(b) What is a Galilean reference frame? Write the expression for velocity transformation in special theory of relativity. Using this expression, show, how energy transformation does takes place.

Q4. (5,5)

(a) For electromagnetic wave propagation through free space, obtain the wave equation and show that the flow of energy occurs along direction of propagation of the waves.

(b) Find the speed of electromagnetic wave travelling in loss-less medium with permeability 4.5 times that of free space and permittivity twice that of free space. Using electromagnetic wave theory, show that the refractive index of a dielectric medium is given by $n=\sqrt{\epsilon_r\mu_r}$.



(Please write your Enrollment Number)

Enrollment No. 04101032015

Second Minor Examination
(November-2015)

Subject Code: BAS-103	Subject: Applied Physics-I
Time : 1 ½ Hours	Maximum Marks : 30

Note: Q. 1 is compulsory. Attempt any two questions from the rest.

Q.1 Do any five parts: - **(2x5=10)**

(a) Write the statement and expression for Poynting theorem.
(b) Write the wave equation for a conducting medium. How will you modify it for a dielectric medium?
(c) State the basic postulates of special theory of relativity.
(d) Draw a light cone and indicate space like, time like and light like events.
(e) Give the expression for Lorentz Transformations in Minkowiski space.
(f) Give the value and expression of wave impedance in vacuum.

Q. 2 **(5,5)**

(a) How does the time dependent field modify the Ampere Circuital Law? Explain How Conduction current is different from displacement current.
(b) Write the expression for Continuity equation. How does it change for a source or sink of charges?

Q. 3 **(5,5)**

(a) You have kept your mobile phone (working at 800 MHz) is an Iron Almirah. The resistivity of iron is $10.1 \times 10^{-8}\Omega m$. The relative permeability of iron is 500. Calculate the thickness of the Iron sheet upto which the signal of the mobile phone will travel.
(b) Find the wave equation for propagation of electromagnetic wave in non conductive medium. Prove the transverse nature of electromagnetic waves.

Q. 4 **(5,5)**

(a) Two photons are approaching each other. Calculate the speed of one photon as observed by the other.
(b) Show that a circle $x^2 + y^2 = r^2$ in frame S appears to be an ellipse in a frame S' moving with a velocity v relative to S. Calculate the change in area.

Or

Show that the minkowiski space time interval is invariant under Lorentz transformations.