

Student Id

--	--	--	--	--	--	--

No. of Pages : 2

B Tech

First Semester (End Sem) Examination Dec 2015

PHYSICS (PH101)

Branch : EEE & ETC

Time 3 Hours

Max Marks : 50

[Answer any five questions including Q.No. 1 which is compulsory]

- Q.1 (i) Define poyating vector & write the expression of its magnitude. [2 X 5]
(ii) If $\vec{\nabla} \times \vec{E} = 0$, then mention time physical significance of \vec{E} .
(iii) Write the schrodinger's time dependent equation wrt Hamiltonian Operator.
(iv) What is a negative crystal ? Give two examples of it.
(v) Define relaxation time (τ) & express the total energy of a damped oscillator with respect to τ .
- Q.2 (a) Using Maxwell's equation derives the equation of electromagnetic wave Wrt \vec{E} in a charge free non conducting medium. [7 + 3]
(b) If a vector field $\vec{A} = 2x\vec{i} + 2y\vec{j} + 2z\vec{k}$, then find Curl \vec{A} .
- Q.3 (a) Discuss the construction & working principle of Nicol's prism. [8 + 2]
(b) Determine the angle of incidence in air when an unpolarised light strikes the interfacial line of air- water so that the angle between reflected & refracted ray is 90° . ($\mu_w = 4/3$)
- Q.4 (a) Using stroke's theorem show that [4 + 4 + 2]
 $\vec{\nabla} \times \vec{E} + \frac{\partial \vec{B}}{\partial t} = 0$
(b) Using Gauss Divergence theorem show That $\vec{\nabla} \cdot \vec{B} = 0$
(c) Distinguish between conduction current & displacement current.
- Q.5 (a) Prove that the quantum wave of a free particle in space is given by
 $\nabla^2 \psi + \frac{2mE}{\hbar^2} \psi = 0$ [6 + 1 + 3]
(b) In quantum mechanics the zero point energy of a simple harmonic oscillator is _____.
(c) What is the expression of a normalized wave function along x - axis from $x = 0$ to $x = L$?
- Q.6 (a) With the help of proper ray diagram show that the focal length of a zone plate has general expression $f_n = \frac{r_n^2}{n\lambda}$
(b) If the width of the opaque part is twice that of each slit, which order spectra will be missing?
(c) Distinguish between E-Ray & O-Ray. [6 + 1 + 3]
- Q.7 (a) Show that the total energy of a simple harmonic Oscillator is constant.
(b) Write the different equation of a forced damped oscillator.
(c) The mass of a uniform string of length 25m is 100gm. Find the speed of transverse waves in the string when it is under tension of 16N. [6 + 1 + 3]