(i) **Printed Pages :3]**　　　**Roll No.** ....

(ii) **Questions** :7]

Sub. Code : | 0 | 1 | 4 | 7 |

Exam. Code: | 0 | 0 | 0 | 2 |

B.A./B.Sc.(General) 2nd Semester
1055
PHYSICS

Paper -B : Vibrations, Waves and E.M. Theory-II

Time : 3 Hours]　　　　　　　　　　　　　　　**[Max. Marks : 45**

Note :- (i) Attempt **five** questions in all, selecting. **two** questions from each of Units I and II.

(ii) Unit-III is compulsory.

(iii) Use of non-programmable calculator is allowed.

(iv) Logarithmic tables may be asked for if needed.

UNIT-I

1. (a) Two LC circuits are coupled by mutual inductance. Discuss the behaviour of coupled system and find the frequency of oscillation for the system. Also describe What do YOU mean by loose and tight coupling.　　6

   (b) Define normal coordinates and normal modes of an oscillatory System . Does energy exchange occur in normal modes.　　3

2. (a) Define wave velocity and group velocity. Find a remix Connecting the two. Is group velocity always greater Wave velocity? Comment　　6

   (b) A Wave of frequency 400 Hz is travelling with a velocity $340ms^{-1}$ .How far are two points whose displacement Differs in phase $\pi/2$.　　3

1

3. (a) Derive an expression for characteristic impedance of a string in terms of linear density and wave velocity . 5
   (b) Discuss the use of anti-reflecting coatings on our lenses for use in our telescopes and microscopes . 2
   (c) What do You mean by inertia controlled and stiffness controlled oscillators? 2

UNIT-II

4. (a) Find out the equation of em wave in a medium having finite Permittivity ε and permeability μ but with conductivity $\sigma = 0$. 8
   (b) The light is generally characterised by electric field vector $\bar{E}$, although it posseses magnetic field $\bar{B}$ also, explain why ? 1

5. (a) Find characteristic impedance of a medium for anem wave Calculate its value for a dielectric medium. 7
   (b) Calculateskin depth for a medium with $\mu = 4\pi \times 10^{-7} Hm^{-1}$ and $\sigma = 2 \times 10^{7} Sm^{-1}$ for an em wave with frequency 10^{10} Hz passing through it. 2

6. (a) Find reflection and transmission coefficientsof anem wave incident normally on a plane between media of impedances Z_1 and Z_2. 9

UNIT-III

7. Attempt any *six* parts, each part carries 1½ marks :
   (a) Name and write the law which indicates the absence of Monopoles .

(b) Calculate the maximum value of magnetic field of em Wave that has maximum electric field of 1000 Vm^{-1}.

(c) Give the characteristics of em wave.

(d) What is dispersion ? Does refractive index of medium depend upon wave frequency.

(e) Distinguish between em Wave and mechanical wave.

(f) Give the physical significance of Poynting vector.

(g) Define coupled oscillator. Give two examples.