

**PC 1213-MH**

**AS/2058**

**VIBRATIONS AND WAVES—II**

Semester-II

Time Allowed : Three Hours]

[Maximum Marks : 30

**Note :** The candidates are required to attempt *two* questions each from Sections A and B carrying 5 marks each and the *five* from Section C consisting of 7 short answer type questions carrying 2 marks each.

**SECTION-A**

1. What do you understand by wave motion ? What are different types of waves ? Derive expression for velocity of transverse waves. 5
2. Show that for a plane progressive wave, half the energy is kinetic and other half is potential. 5
3. Show that normal modes are independent of each other and there is no exchange of energy between the two modes. 5
4. Discuss the inductive coupling of two electrical oscillators. 5

**SECTION-B**

5. Show that the impedance of free space for EM waves is 377 ohm. 5

6. What is Poynting vector ? State the Poynting vector theorem and describe its significance. 5
7. Calculate the coefficients of reflection and transmission of energy of the normally incident e.m. waves on the surface of water. Given dielectric constant of water = 81. 5
8. What is skin depth ? Prove that it is inversely proportional to the square root of frequency and conductivity. 5

### SECTION-C

(Attempt any **five** parts.)

9. (a) Differentiate between conducting and dielectric medium.
- (b) What do you mean by dispersive medium ?
- (c) Write four characteristics of EM waves. :
- (d) As the conductivity increases, the conductor behaves as a short circuit in the e.m. waves. Justify the statement.
- (e) Define phase velocity and group velocity.
- (f) Explain the meaning of a coupled oscillator.
- (g) What do you mean by degrees of freedom ? 5x2=10