Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(CS) (2013 & Onwards) (Sem.–2)

THEORY OF WAVES & OSCILLATIONS

Subject Code : BCS-204

M.Code : 71509

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and a student has to attempt any FOUR questions.**

SECTION-A

1. Answer briefly :

(a) What are the dimensions of force constant of vibrating spring?

(b) A particle executes simple harmonic motion with a time period of 2 seconds and amplitude of 5 cm. Find the maximum velocity.

(c) Define logarithmic decrement.

(d) What oscillates in simple harmonic electrical oscillator?

(e) Does viscous damping remain proportional to velocity under all conditions?

(f) Prove that the displacement resonant frequency of driving force is less than the natural frequency of the undamped oscillator.

(g) What is mechanical reactance? What are its two important constituents?

(h) What is the physical significance of Q-value of a forced oscillator?

(i) Which is greater the natural frequency of damped oscillations or frequency of displacement resonance?

(j) What do you mean by standing waves?

SECTION-B

2. Derive an expression for the total energy of a simple harmonic oscillator and show that it is constant and proportional to the square of the amplitude.

3. Using the general solution of equation of damped harmonic oscillator discuss the case of critical damping.

4. Define Quality factor of a damped oscillator. Deduce an expression for it for a mechanical oscillator and an electrical oscillator.

5. Derive an expression for the velocity amplitude of a forced oscillator. Discuss the variation of velocity amplitude with driving force frequency and show its behavior graphically.

6. Explain the meaning of coupled oscillator. Define and explain normal coordinates, degrees of freedom and normal modes of vibration of an oscillatory system.

7. Show that all energy arriving at the boundary in the incident wave leaves the boundary in the reflected and transmitted wave. Define reflection and transmission coefficients of energy. Show that the sum of the reflection and transmission coefficients of energy is always unity.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.