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

Total No. of Pages : 02

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B.Sc.(CS) (2013 & Onwards) (Sem.–2)

THEORY OF WAVES & OSCILLATIONS

Subject Code : BCS-204

Paper ID : [A2608]

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

Q1. Answer briefly :

a) Differentiate between simple harmonic motion and oscillatory motion.

b) Find the expression for the velocity of a simple harmonic oscillator.

c) Define logarithmic decrement.

d) Find the frequency of an LCR circuit with L = 2 mH, C = 5 μF and R = 0.2 ohm.

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) Is the energy stored in forced oscillator? Explain and justify.

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

i) Define the term group velocity and its significance.

j) What do you mean by standing waves?

SECTION-B

Q2. What is compound pendulum? Derive an expression for its time period. What is the condition for the time period to be minimum?

Q3. Using the general solution of equation of damped harmonic oscillator discuss the case of critical damping.

Q4. Define quality factor of a damped oscillator. Deduce an expression for it for a mechanical oscillator and an electrical oscillator.

Q5. 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.

Q6. Discuss the variation of the electric current amplitude and phase with frequency of applied e.m.f. in an LCR circuit. At what frequency will the current be maximum?

Q7. Explain the term impedance matching. State the conditions for the perfect impedance matching between two media. What are the uses of impedance matching?