

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(CS) (Sem.-2)
THEORY OF WAVES & OSCILLATIONS

Subject Code : BCS-204

M.Code : 71509

Date of Examination : 12-07-22

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) Are all periodic motions simple harmonic motion? Is the reverse true?
- b) What is the importance of compound pendulum?
- c) What is damping? On what factors the damping depends?
- d) Examine whether the discharge of a capacitor of $1 \mu\text{F}$ through a resistor of 400Ω and inductor of 0.1 H is oscillatory or not?
- e) What is the physical significance of quality factor?
- f) What is the physical significance of the mechanical impedance of a forced oscillator?
- g) What is meant by transient and steady state behaviours of a forced oscillator?
- h) Do the normal modes exchange energy with each other?
- i) 'In case of a string, the wave velocity is a function of elasticity and inertia of the medium'. Comment.
- j) What is the characteristic impedance of a perfect conductor to the electromagnetic wave?

SECTION-B

2. What is simple harmonic motion? Derive the differential equation of simple harmonic motion. Also, prove that energy of Simple harmonic motion is conserved.
3. Write the equation of motion of a damped simple harmonic system. What are the different solutions of this equation? Discuss the case of oscillatory damped simple harmonic motion.
4. Name the various methods, along with their principles for quantitative measurement of damping effect in a damped harmonic oscillation.
5. Discuss the behaviour of displacement versus driving force frequency in a forced oscillator. Prove that the resonant frequency of driving force is less than the natural frequency of displacement.
6. What is the significance of the normal modes of a coupled system? Explain the transfer of energy between two electrical circuits which are inductively coupled. When the coupling is loose or tight?
7. Discuss analytically the formation of standing waves in a string of fixed length. Explain how the characteristics change with distance. Give general account of distribution of energy in standing wave.

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.