B.Sc. (Non Medical)   (Sem.–4)
WAVE VIBRATIONS
Subject Code : BSNM-403-18
M.Code : 77681
Date of Examination : 06-07-22

Time : 3 Hrs.   Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   (a) The frequency of simple harmonic motion is 200 Hz. What is the time period?

   (b) Write the units of damping constant of mechanical and electrical oscillator.

   (c) How logarithmic decrement is related to damping coefficient of a damped electrical oscillator.

   (d) Show that the displacement resonance occurs at a frequency slightly less than the frequency of velocity resonance.

   (e) What is the physical significance of electrical impedance of a forced oscillator?

   (f) What is the value of ratio of displacements for in phase and out of phase mode?

   (g) What determines the number of modes of a system of coupled oscillator?

   (h) State the characteristics of a plane wave.

   (i) What do you mean by characteristic impedance of a string?

   (j) 'Two electric transmission cables are joined at a point'. What special care should be taken for proper transmission of power?

SECTION-B

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

3. Show that the energy of damped vibrations of a damped simple harmonic oscillator decreases exponentially with time.

4. Derive an expression for the velocity amplitude of a forced oscillator Discuss the variation of phase difference between velocity and driving force frequency.

5. What is meant by coupling of two oscillators? Discuss completely the oscillations of two identical stiffness coupled pendulums and write the equation of motion of the system in different cases.

6. Define reflection and transmission coefficient of amplitude. What is the amplitude of transverse waves reflected at the dense medium?

SECTION-C

7. Derive the differential equation of motion for a damped harmonic oscillator and obtain an expression for displacement. Discuss the case of critical damping.

8. Derive an expression for the Q-value of a forced oscillator in terms of resonance absorption band width. If the Q-value of an oscillator is increased how is band width of the absorption curve affected.

9. Obtain an expression for the energy of a transversely vibrating string. Hence, derive an expression for the rate of flow of energy along the stretched string.

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