

# Bankim Sardar College

Test 2020 (Theory)

Sem: IV

Course: General

Paper: CCG4

## Group-A

1. Answer all the Questions-

10x1=10

- i) What is the S.I. unit of Frequency?  
a) Hertz b) watt c) second d) None of the above
- ii) The total energy of a simple harmonic oscillator is -  
a) Constant throughout the motion b) varies with time c) a and b are correct  
d) none of the above
- iii) Restoring force is proportional to  
a) displacement b) velocity c) acceleration d) all of the above
- iv) damping force is proportional to the  
a) velocity b) acceleration c) total energy d) none of the above
- v) Initial phase of a simple harmonic oscillator is known as the  
a) Epoch b) phase difference c) a and b are correct d) all are correct
- vi) Natural frequency is-  
a) Original frequency of a body b) any frequency c) a and b are correct d) None of the above
- vii) Resonance occurs when  
a) Natural frequency and frequency of external force are equal b) Natural frequency and frequency of external force is equal c) a and b are correct  
d) none of the above
- viii) Velocity resonance occurs when  
a)  $\omega = \omega_0$  b)  $\omega \neq \omega_0$  c) a and b are correct d) none of the above
- ix) Sharpness of resonance means  
a) Rapidity with which power fall on either side of the resonance frequency  
b) Increase of power with frequency c) a and b are correct d) none of the above
- x) Band width of the resonance graph is  
a)  $\omega_2 - \omega_1$  b)  $\omega_2 + \omega_1$  c)  $\omega_2 = \omega_1$  d) None of the above

## Group B

2. Answer all Questions

3x10=30

- A. What is resonance? How does it take place in a sonometer?
- B. Write the working formula for the sonometer experiment. Does the resonating length vary with suspended load?
- C. In the experiment a resonance was found for frequency 480 Hz at 10 cm. Calculate the resonating lengths for frequencies 520 Hz and 450 Hz.

### Group C

Answer Question No. 3 and any 6 from the rest.

3. Answer all the Questions 10x2=20
- i) What is periodic and aperiodic motion?
  - ii) What is forced oscillations?
  - iii) What is amplitude resonance?
  - iv) What is quality factor of resonance?
  - v) What is superposition of simple Harmonic motions?
  - vi) What is beats?
  - vii) What is Lissajous's Figure?
  - viii) What is transverse wave and longitudinal wave?
  - ix) What wave velocity?
  - x) What is wave front?
4. What are characteristics of a Simple Harmonic Motion (SHM)? Show that total energy of a SHM remains constant throughout the motion? 2+3
5. What is a 'damped simple harmonic oscillator'? Derive differential equation of a damped simple harmonic oscillator. 2+3
6. What is 'resonance'? Explain a typical resonance curve with reference to difference damping. 2+3
7. Explain: Velocity Resonance and Amplitude resonance 2+3
8. Show that superposition of two collinear simple harmonic oscillations will give another simple harmonic oscillation. 5
9. What is Newton's formula of velocity of sound? What was Laplace's correction of the formula? 2+3
10. What are group velocity and phase velocity? Establish a relation between them. 2+3
11. Derive the differential equation for two simple harmonic oscillations having different amplitudes and incident perpendicular to each other. 5